ELECTRICAL TIMES

THURSDAY
13 NOV.
1952
NINEPENCE

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They are shock-proof and fire resistant and therefore particularly suitable for domestic installations.

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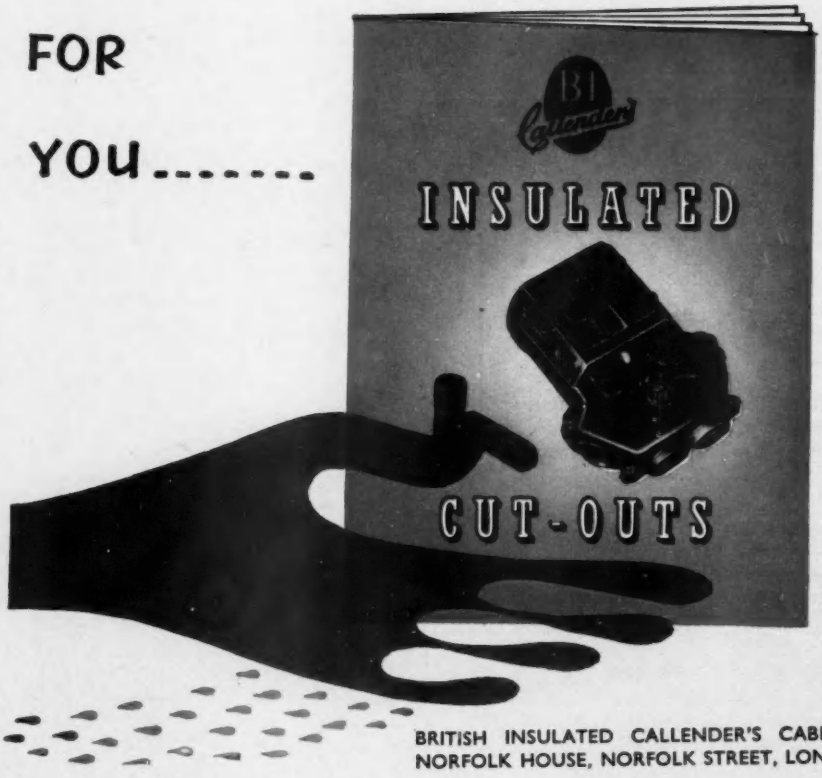

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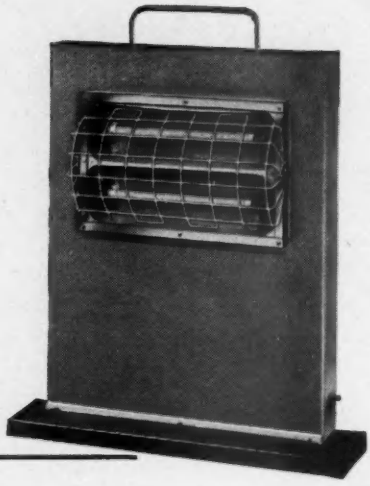

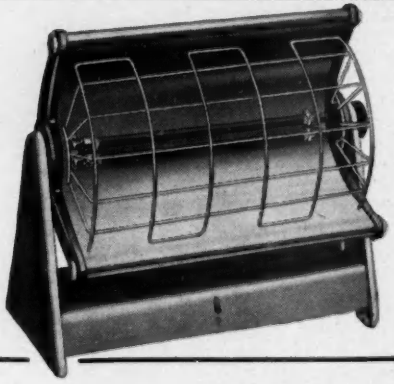

Model F.43 (above). Satin silver finish with black and chromium fittings. 2 kW, one bar controlled by switch.

£9.11.0 (Inclusive of P.T.)

Model F.103 (left). A high quality reflector fire in black and ivory. 2 kW, one bar controlled by switch.

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Model F.101 (1 kW) and **F.102** (2 kW). Two good quality fires at very reasonable prices. Finished in florentine bronze.

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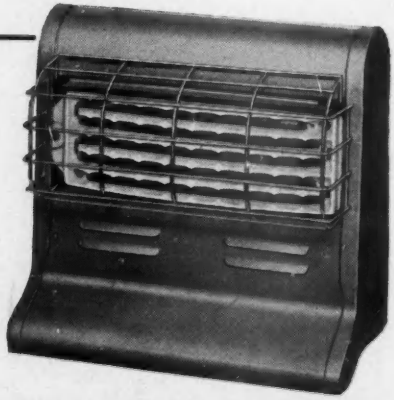

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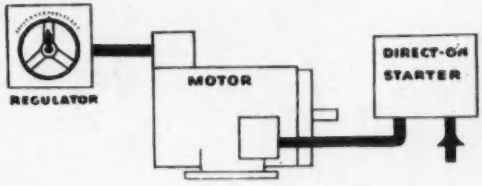

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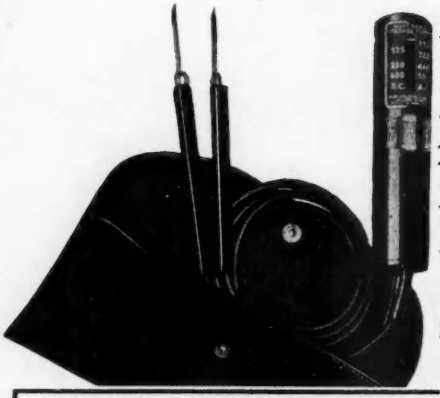

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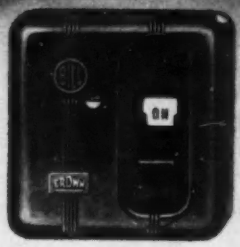

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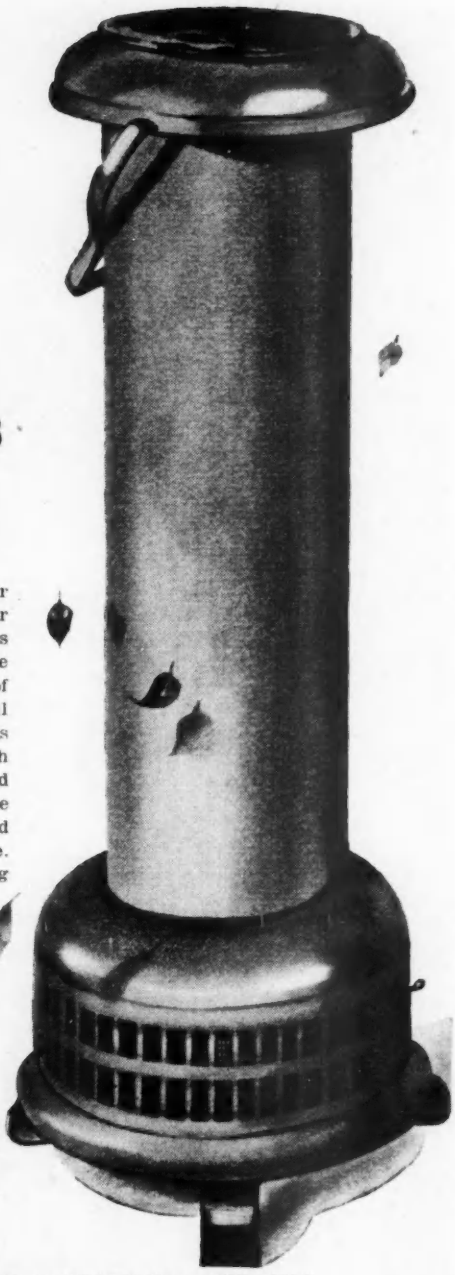

in Autumn

a Housewife's thoughts turn to Home-heating

All over the country housewives are preparing for winter, storing preserves, knitting woollies for their children *and* looking for heating appliances to keep their homes cosy. They are pondering the advantages of this appliance against the price of that. One heating appliance that will meet all their needs is the Belling Champion. First, it is entirely safe. Second, it gives a lot of cosy warmth for low current consumption — it can be switched to "low" to maintain the temperature once the room is warm. Third, it heats the *whole room* and heats it quickly. Fourth, it is easily portable. And fifth, in the kitchen it will dry the washing on wet days. The Belling Champion is very attractive to housewives who buy intelligently. Three sizes are available, 91A 750 watt £6.3.3. 92A 1500 watt £7.3.2. 83A 2250 watt £7.12.9. All three prices include tax. Be sure that you have sufficient stock to meet the demand. Order your Belling Champions NOW.

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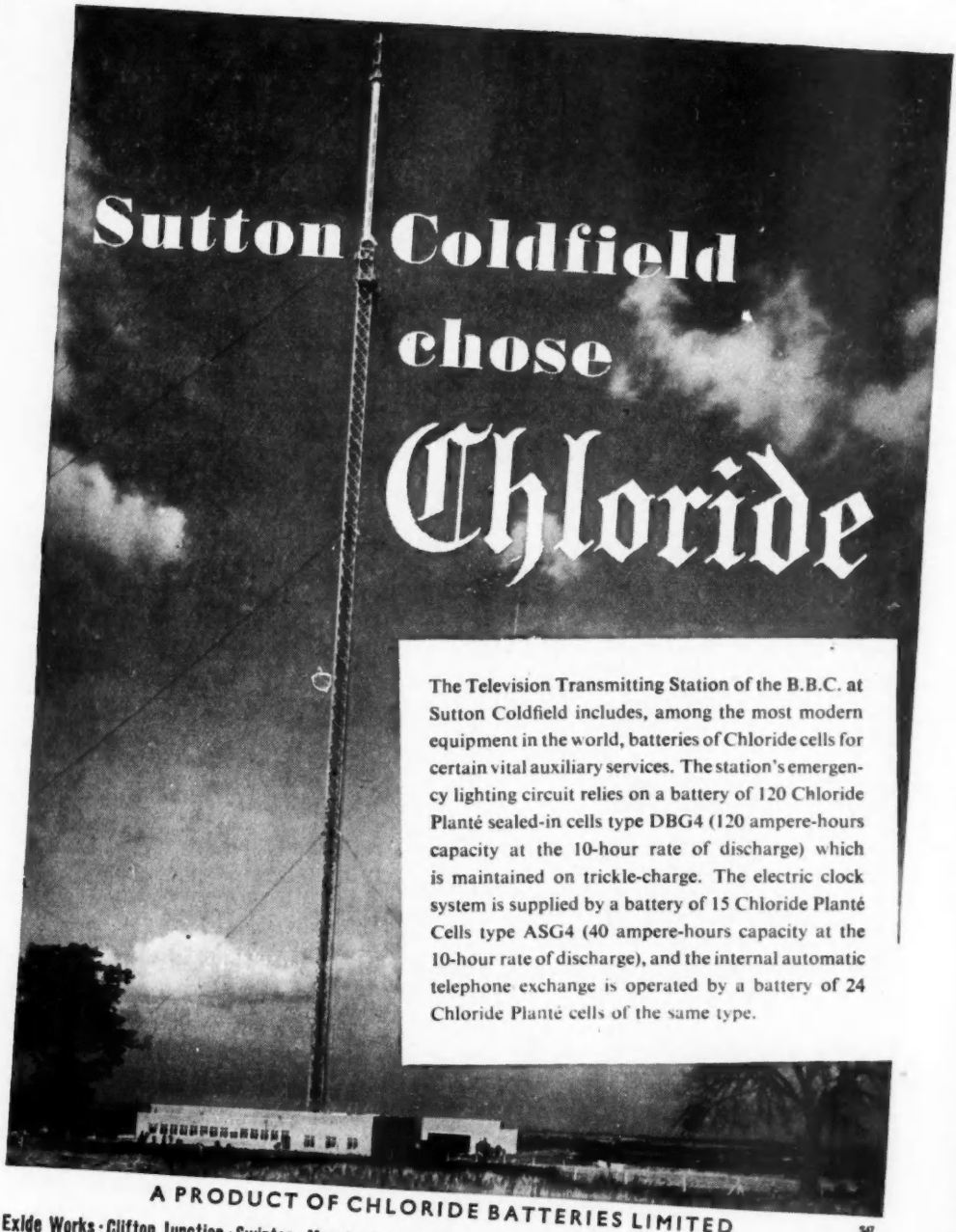

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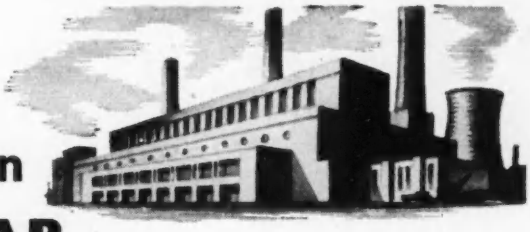

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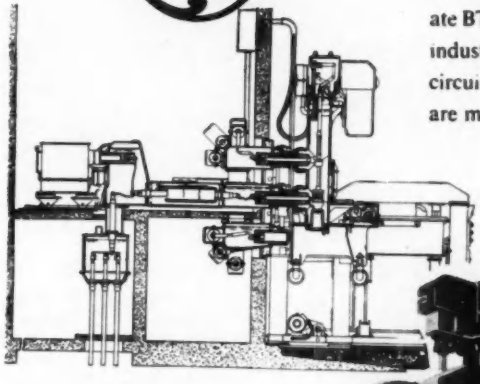
by

B T-H

Functional reliability of switchgear associated with the transmission of electric power is of paramount importance. Thus many of the world's largest electric supply systems incorporate BTH switchgear. All types from low voltage industrial distribution boards to the largest circuit-breakers for systems up to 300,000 volts are manufactured by BTH.



Cross-sectional drawing showing a typical duplicate busbar equipment.

1,000 MVA, 33 kV, class MF59 switchgear installed at the Ocker Hill Power Station of the BEA Midlands Division.

For all important installations
specify BTH switchgear

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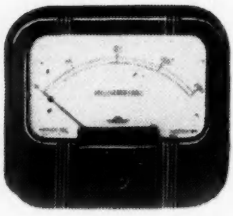

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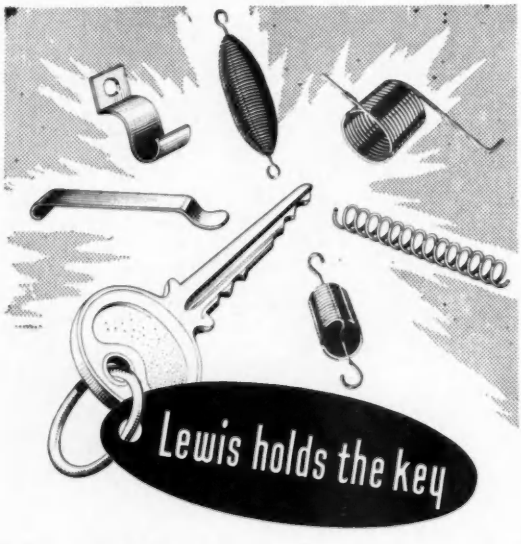

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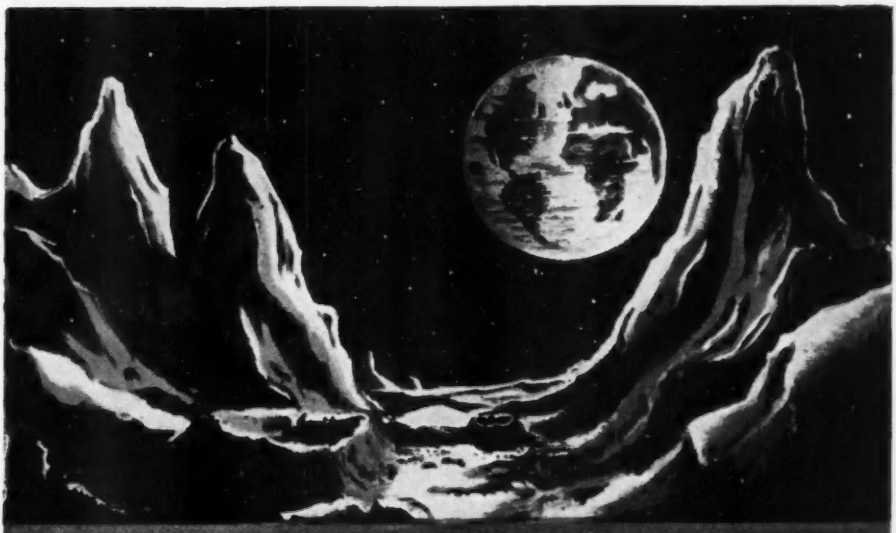

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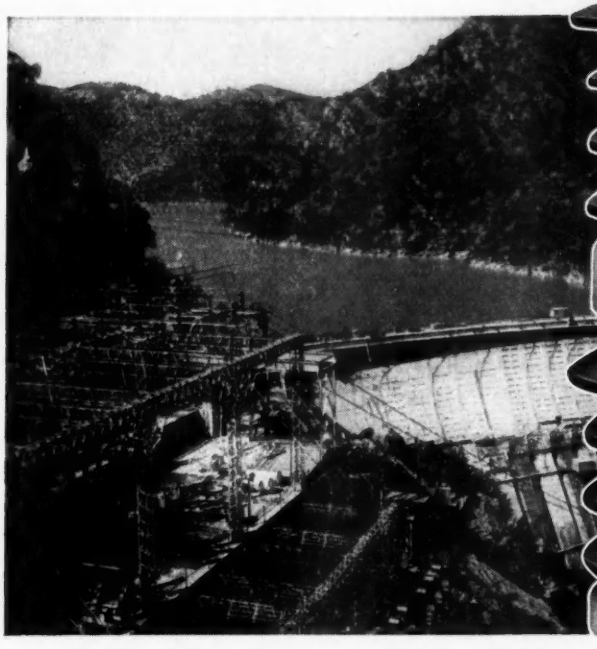
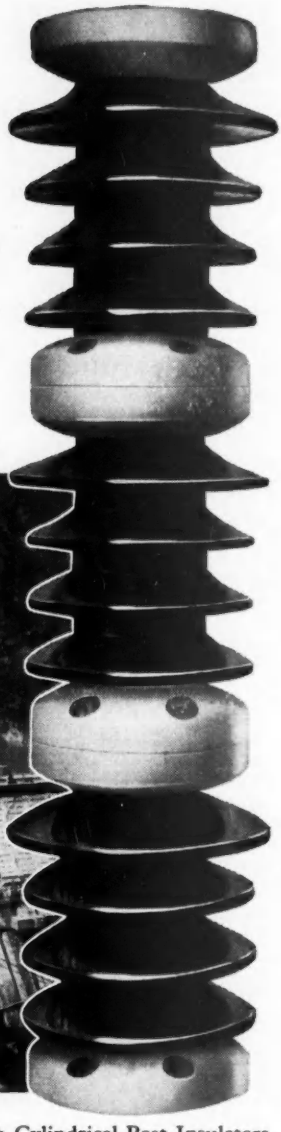
S.P.P. INSULATORS IN SERVICE

Cylindrical Post Insulators in New South Wales





The Burrinjuck 132kV. switching station was equipped with Cylindrical Post Insulators type P.703. This is one of many stations on the New South Wales Public Works Department system equipped throughout with S.P.P. Post Insulators for 132 kV., 110 kV. and 66 kV.

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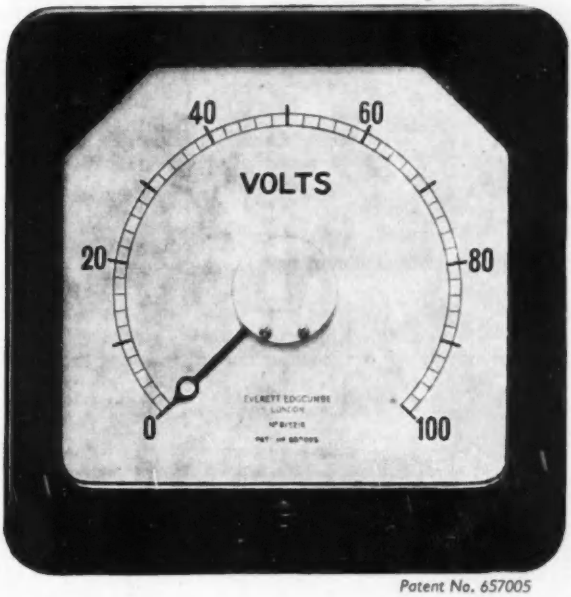

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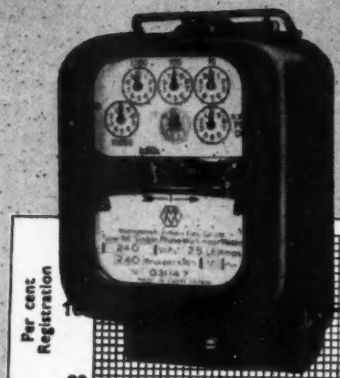
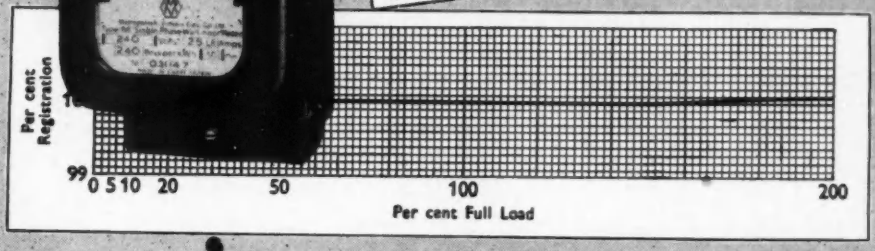
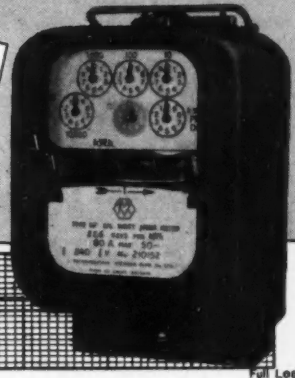
Metrovick Type NF Meters

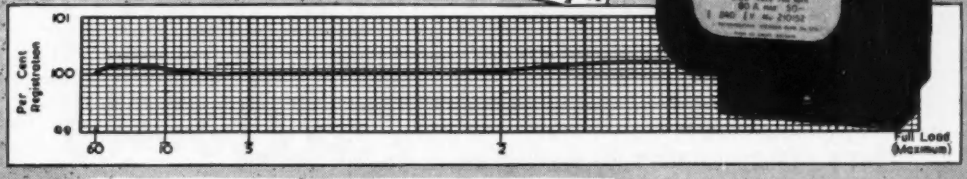


Available either to BS 37—1937
in long range capacities of $2\frac{1}{2}$, 5, 10, 25 and 50 amps.



Or to BS 37 (Parts 1 and 2) 1952
in maximum continuous rating capacities of 10, 40 and 80 amps.





In designing the Type NF meter Metrovick engineers anticipated the requirements of the 1952 specification, consequently the two patterns are fundamentally similar.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER 17
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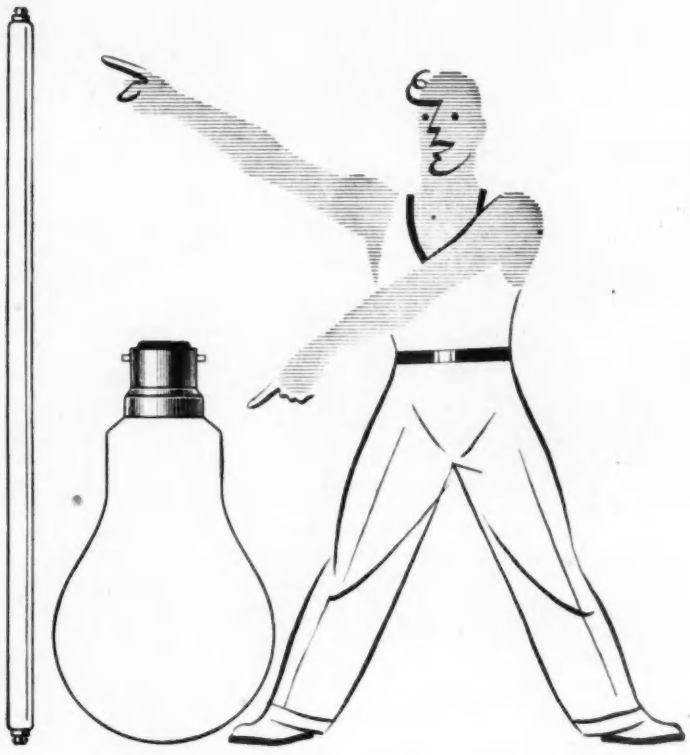

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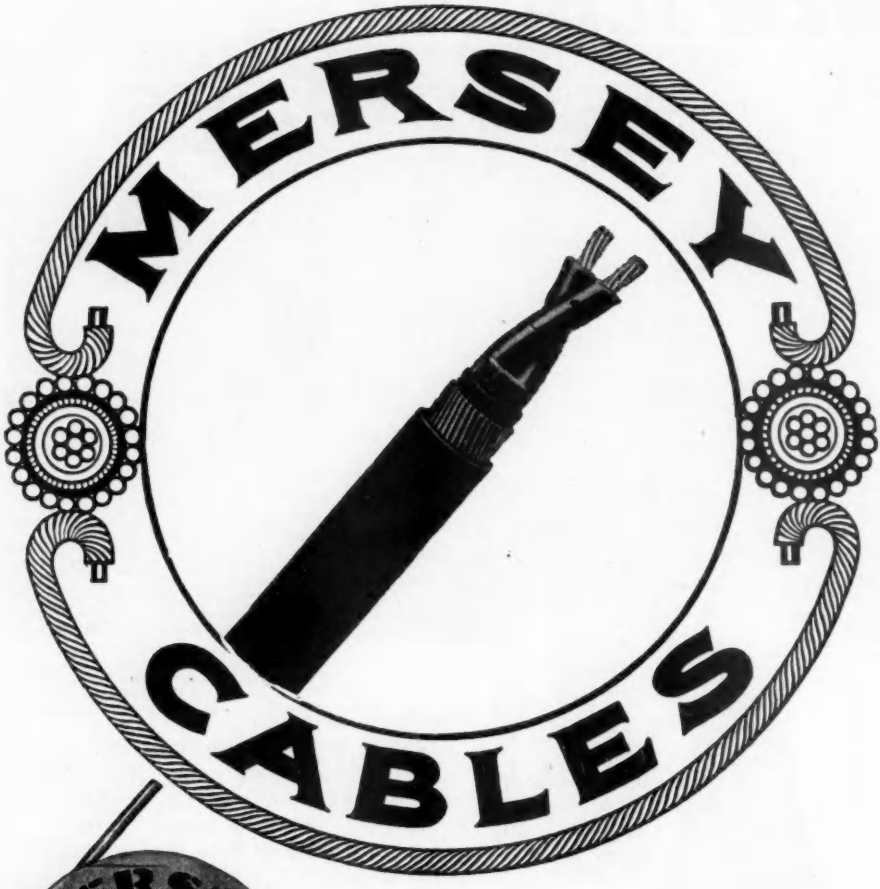

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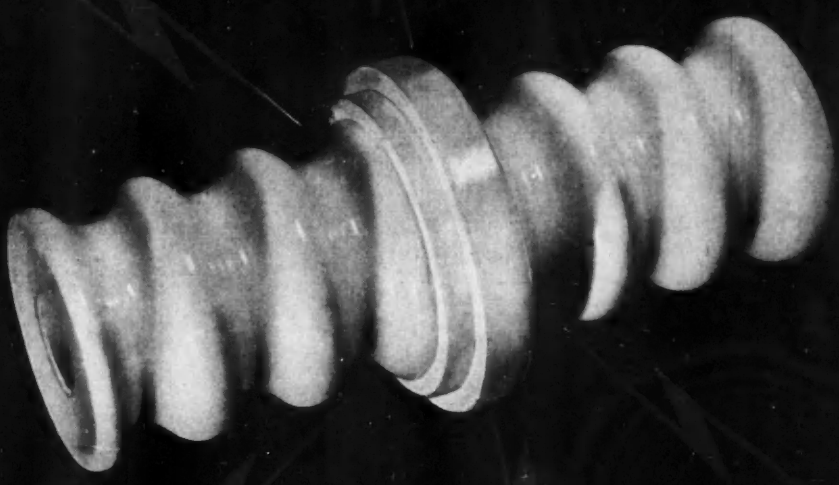

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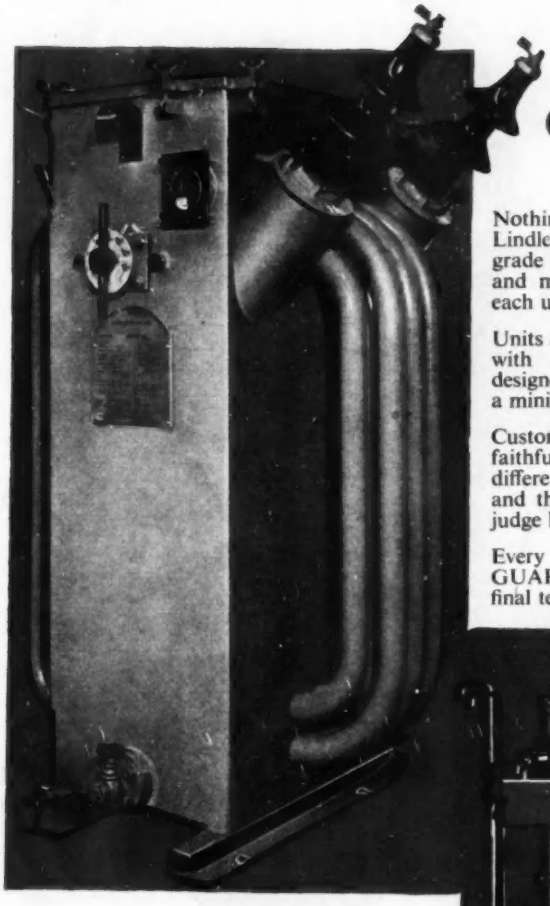

Typical Outdoor Units

Nothing is skimped in the manufacture of Lindley Thompson Transformers. Top grade 100% British materials are employed and mass production is not encouraged: each unit design is treated individually.

Units are tested to ensure that they comply with B.S.S. 171 specification and are designed for economical operation and a minimum service cost.

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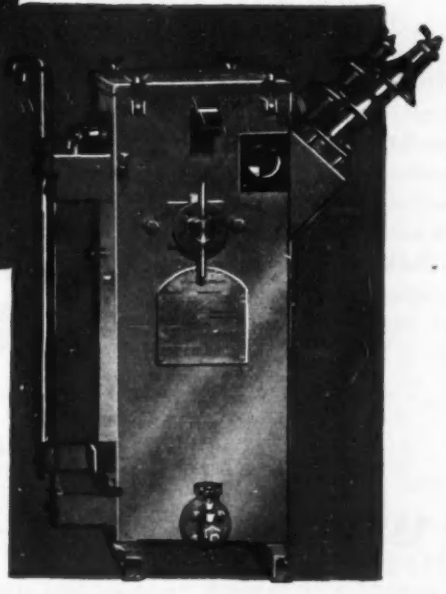
Every unit carries a TWO YEARS' GUARANTEE from the date it passes its final tests.



Outdoor platform pole type.
100 kVA single phase, 50 cycles.
Voltage ratio 11,000/250 plus 250.

25 kVA. Outdoor pole type, single phase, 50 cycles. Voltage ratio 11,000/250 plus 250, fitted with hangers. Each transformer is fitted with off-load tapping switch, oil level indicator, oil drain valve and thermometer pocket.

THE LINDLEY THOMPSON TRANSFORMER & SERVICE CO. LTD.
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RELIABILITY:
A most important feature for any unit in daily use... Design — Workmanship and Quality of Materials... coupled with rigorous inspection — are factors which contribute to the *high standard* of every 'Britmac' Product.

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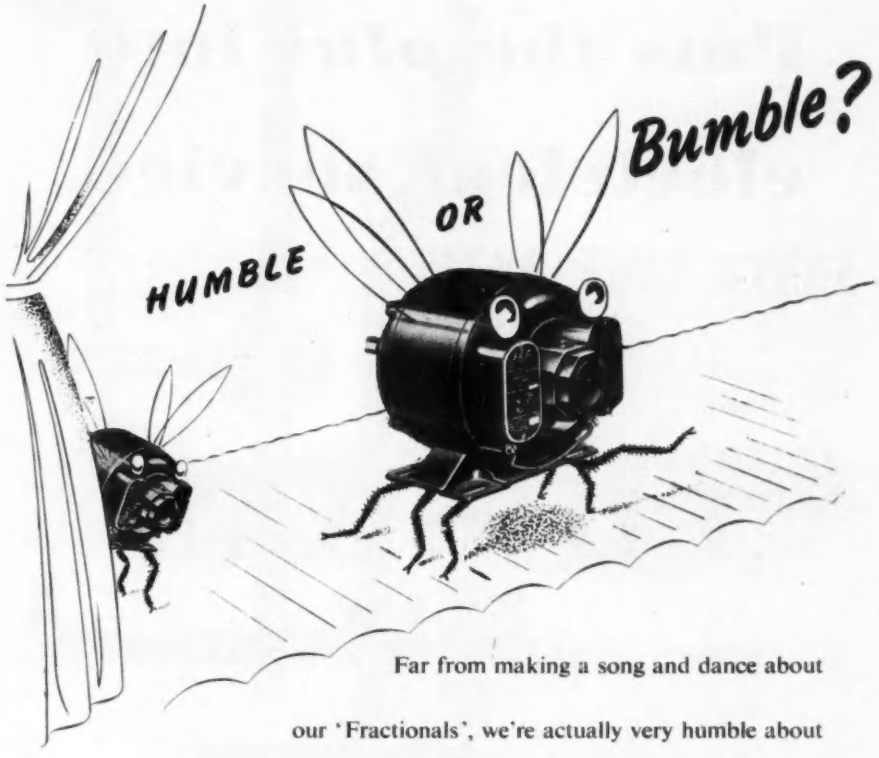
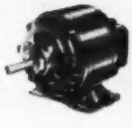


Far from making a song and dance about our 'Fractionals', we're actually very humble about all the nice things said in their praise. And that's no bumble, either! So popular have these busy-bee 'Fractionals' become that if you want to put them on *your* payroll, you had better phone your nearest G.E.C. agent without delay.

G.E.C.



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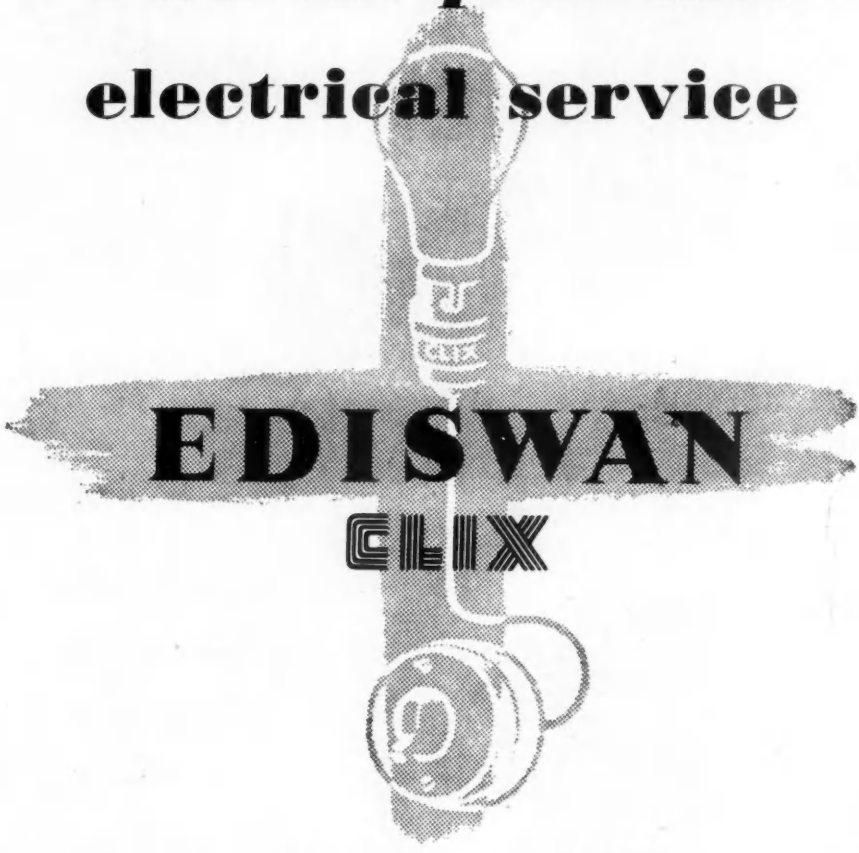

An event of paramount importance to all concerned with electrical installation is the taking over by The Edison Swan Electric Co. Ltd. of Clix and Genacco electrical accessories. Everything required for a highly efficient service—lamps, lighting fittings, cables and accessories—can now be supplied by The Edison Swan Electric Co. Ltd. Bear this in mind when planning new installations or modernising existing ones.

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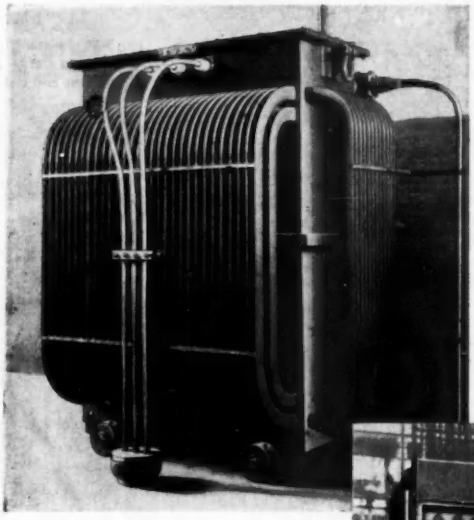

(ABOVE) One of two 1,000 kVA 11kV/400-230 volt Stepdown Transformers, at Frankley pumping Station Birmingham.

(OPOSITE) A Mercury-arc rectifier providing a 300 amp. general load in a works Substation.

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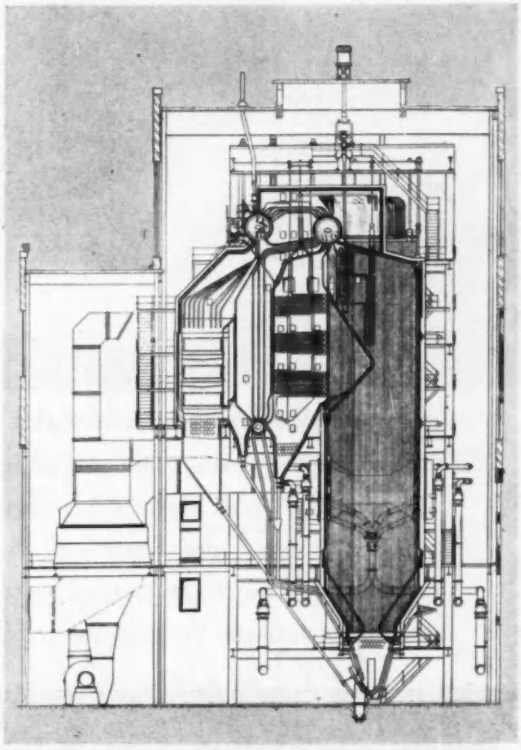

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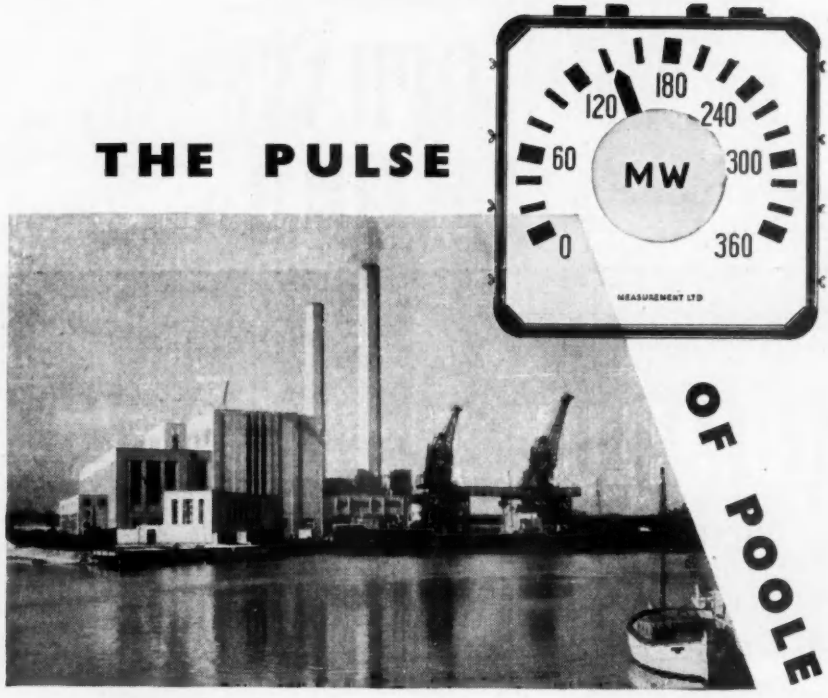

Boiler room. Turbine room. Control room. The men at the controls need a perpetual finger on the pulse . . . a constant knowledge of the station's load. At Poole, and in other power stations all over the country, B.E.A. has installed Measurement Telewattmeters with mammoth load indicators —30" and larger, single or double sided, with or without internal illumination. Easy to read and easy to maintain, giving a lifetime of service.

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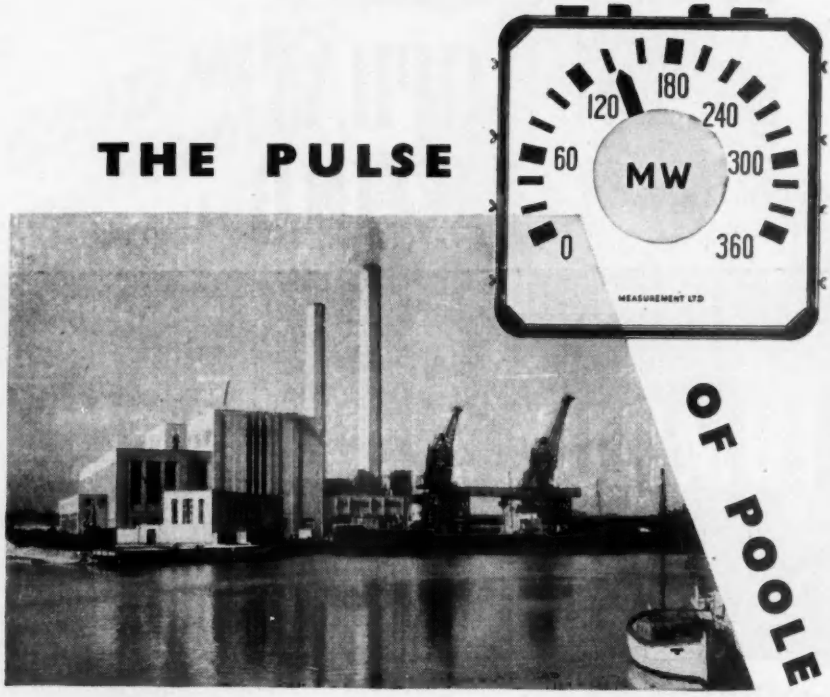

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These three fittings are recent additions to the ELECO range of street lighting lanterns and embody all the latest improvements as recommended in B.S. Specification 1788 for lantern construction.

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The LANCASTER lantern is a controlled cut-off fitting which reduces glare to a minimum. The distribution from the horizontal Mercury discharge lamp in the upper half of the fitting is reflected by means of specially designed reflectors through the scientifically designed refractor bowl giving high and even illumination on the road surface.

The GOLDEN RAY MARK III lantern is completely dustproof and is available for all sizes of sodium discharge lamps. The "Perspex" refractor plates have machined "Perspex" prisms sealed by a special process to the interior of the outer enclosing "Perspex" bowl and because of the unique dustproof qualities of this fitting, maintenance costs are reduced to a minimum.

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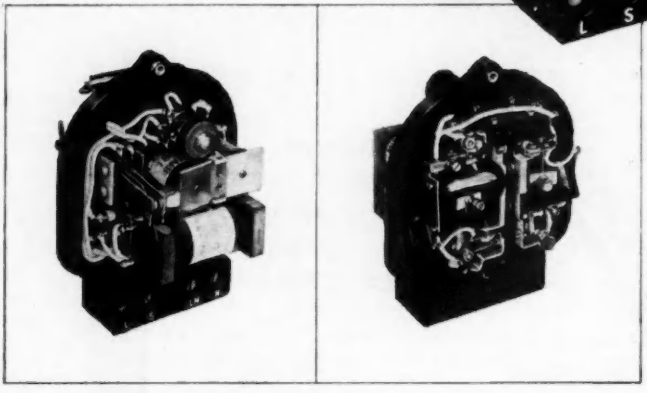
Everything under control

Intended exclusively for street lighting control, the "Rythmatic" Type 46 Control Switch is the outcome of considerable research and development work in which the aim was to produce a switch of smaller size. In spite of its compactness, a total of four distinctive signals has been achieved, and, whilst providing the advantages of simple "on" and "off" switching, the Type 46 Control Switch caters for the control of "all-night," "Half-night," and "prior-dawn" lamps.

The Type 46 Control Switch can be accommodated in the same space as an ordinary time switch and can readily be mounted in existing housings, thereby further enhancing its considerable economic advantages for existing street lighting installations.



Shown above complete with covers, which are easily removable for maintenance, the overall dimensions of the Type 46 Control Switch are only 4½" high, 3½" wide and 3¾" deep. The two views on the left of the Control Switch with the covers removed show on the front the terminal block and mechanical-locking switching relay, which may be manually operated for lamp testing, and the two galvanometer relays at the back.

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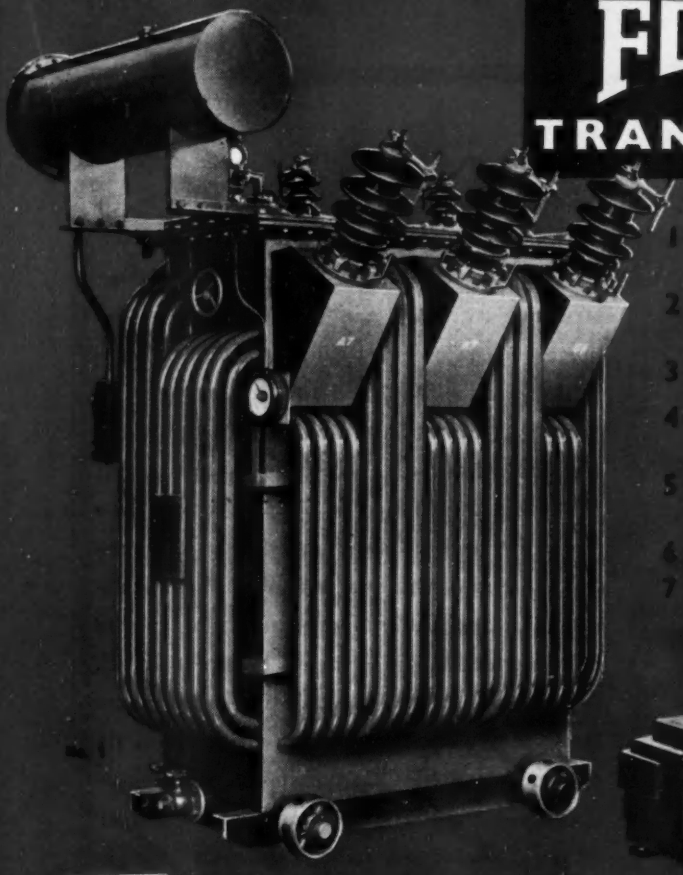
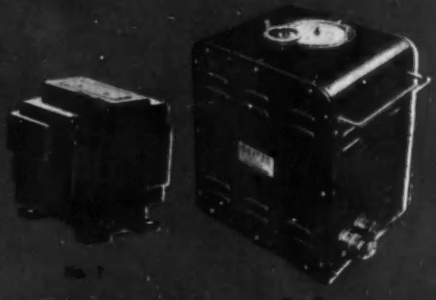
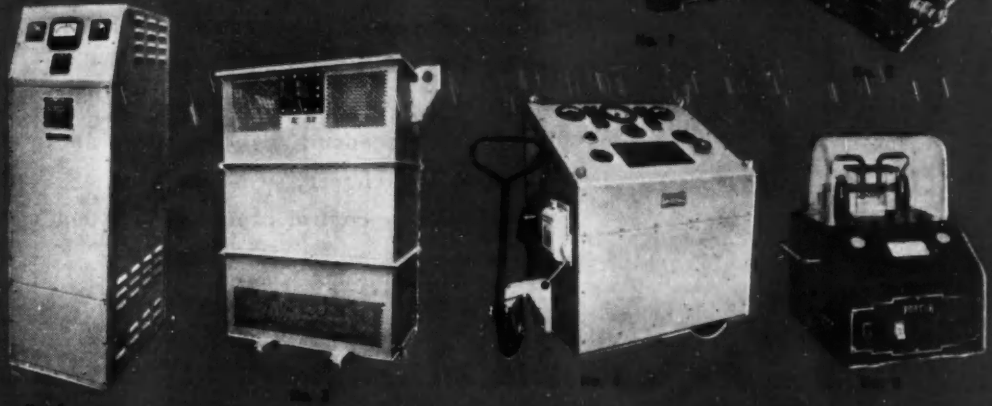
TRANSFORMERS



1. A typical 1800 kVA. 33000 Volt, oil immersed distribution transformer.
2. A typical air cooled Automatic Voltage Regulator.
3. A 400 kVA. single phase, dry type transformer.
4. A typical 2000 amp. current injection test set.
5. A portable set for testing the electric strength of insulating oils.
6. A phase shifting transformer.
7. A typical small enclosed air cooled transformer.





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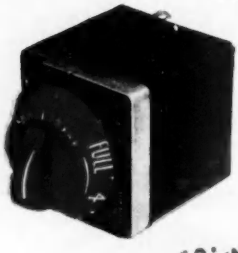

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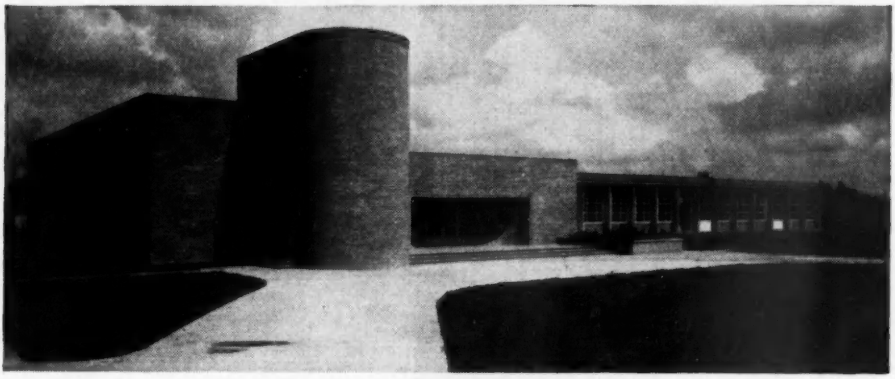

Sydenham Estate, Bridgwater, Junior School

Holway, Taunton, Infants School

Sydenham Estate, Bridgwater, Infants School

Hamp, Bridgwater, Infants School

Crompton rubber cable gets top marks from contractors with school wiring jobs on their hands. These four schools for instance are all wired with Crompton cables. They are in one small district only but are typical of hundreds throughout the country.
Consistent quality in Crompton cable saves time and cuts costs.

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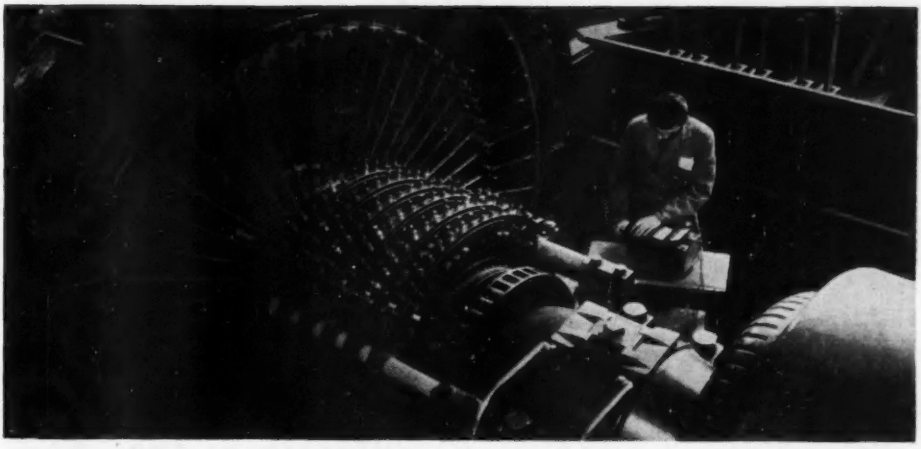

Australian Railway Chiefs say :

"NO PRICE ON SAFETY"

VICTORIA'S EXTENSIVE USE OF "MEGGER" TESTERS AND "DUCTER" OHMMETERS

The Victorian Railways, a State Government Utility operating steam, diesel electric and electric goods and passenger trains, enjoy a high reputation for efficiency and safety. "Megger" portable testing instruments are used very extensively by the various departments throughout the State.

One of the rules of the Victorian Railways Commissioners states: "There is no price on safety." "Ducter" Ohmmeters are therefore also used throughout the organisation for testing all types of contacts and joints, particularly in connection with the automatic operation of railway points.

Since the electrification of the system 38 years ago, the Victorian Railways have used considerable quantities of Evershed equipment—including 50 "Megger" insulation testers. The railways engineers say that they hold these instruments in "very high regard."

Public authorities, industrial and commercial undertakings and private firms throughout the world use the famous "Megger" series of insulation and earth testers, and "Ducter" Ohmmeters because of their finer workmanship and greater accuracy and reliability. Full details of the range of instruments available, and their many uses, are contained in Publications J051/1-5 (insulation testers) and J237 (ohmmeters).

"Megger" and "Ducter" are registered trade marks.

"Megger" Testers Check Italian Telephone Lines. The Societa Telefonica Tirrena, which operates the telephone lines of Liguria, Tuscany, Central Italy, the Vatican City and Sardinia, uses "Megger" Insulation Testers in the maintenance and localisation of faults in cables balanced in groups between cities and, therefore, requiring a high degree of insulation.

All "Megger" Testers used by the S.T.T. are found "satisfactory for precision of readings and sturdiness of construction." List J051/5.

The Indian Posts and Telegraphs Department use "Megger" Insulation and Earth Testers for checking insulation, testing lines and equipment, locating cable faults and measuring earth resistivity.

The photograph shows a routine insulation test with a "Megger" Insulation Tester on a 4,500 kW rotary convertor at the Victorian Railways Joliment Sub-station. The machine is reputed to be one of the largest of its type in the world.

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- Load pointer and time dial clearly visible.
- Substantial contacts for operating separate warning device.

- Time dial (5 min. resetting)
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- Load pointer
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★ The largest oven food capacity in its class

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★ Thermostat control, simmering control, large hotcupboard

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★ Help your consumer and the National effort by recommending

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Since that time they have carried out a considerable amount of research into the use of aluminium as a conductor material to enable them to offer to purchasers an all aluminium cable.

It is worth mentioning that prior to the development of the aluminium sheath the practical and economic advantages to be derived from the use of aluminium as a conductor material were negligible.

As is well known the lower conductivity of aluminium requires the use of a larger conductor than with copper for an equivalent current carrying capacity. The resultant increase in diameter was a serious disadvantage from both the weight and cost aspects when lead was the only available sheathing material.

The situation is, however, radically changed when consideration is given to the use of an aluminium sheath in conjunction with aluminium conductors.

Despite its larger size, an all aluminium cable may be as little as one third of the weight of the equivalent copper conductor, lead sheathed, single wire armoured cable. Obviously the reduced weight is a considerable advantage in all above ground installations — besides facilitating handling and transport for any type of installation — but it is of special importance for cables installed in mine shafts and on ships.

Further, the aluminium conductor and aluminium sheathed cable shows in many sizes a useful price advantage over alternative types of cable.

At present, when there is some uncertainty as to the continuing availability of adequate quantities of copper for cable manufacture, the use of aluminium as a conductor material is a contribution to the conservation of a relatively scarce material. By specifying J. & P. all aluminium cable early delivery can be obtained, in some cases from stock, without sacrifice in the technical efficiency of the installation.

J. & P. have several all aluminium cable installations in service, including distribution cables for the Electricity Supply Industry and mine shaft cables for the National Coal Board.

JOINTING

The jointing technique recommended by J. & P. is simple and follows very closely the procedure normally adopted for copper conductors. It has been used for some years for jointing aluminium conductors and has given fully satisfactory results, while joints made by this method have been exhaustively tested in the J. & P. laboratories and in the field. No change in the normal construction of joints is entailed and standard sleeves and boxes are used.

SUPPLIED FROM STOCK

Any J. & P. Branch will be pleased to give further details and to supply a list of the sizes of cable now available from stock.

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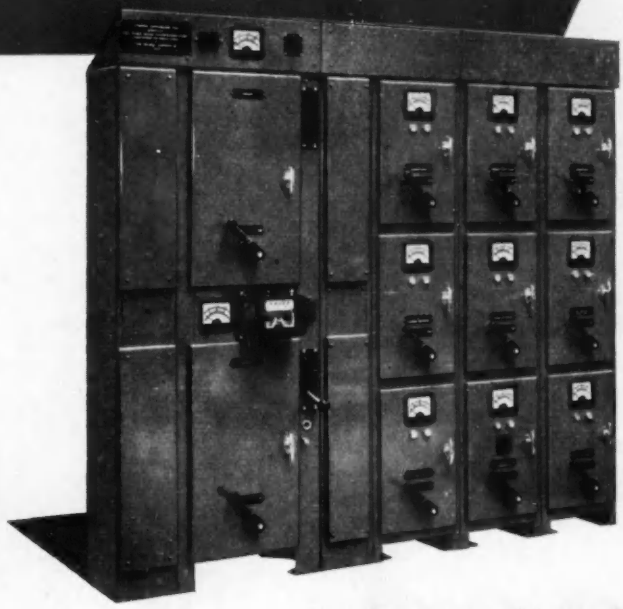

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Illustration shows group of 30-ampere Direct-on Contactor Starters in triple tier formation aligned with 200-ampere capacity Circuit Breakers in double tier, showing the uniformity which can be achieved with units of widely differing current ratings.

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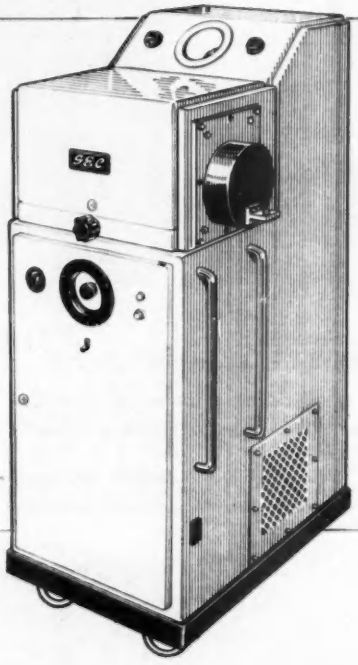
OUTPUT INCREASED 280%

When a gas flame was used to braze the box yoke the spread of heat caused considerable distortion so that it was necessary afterwards to mill the top face and also to redrill the holes. Both these operations are avoided by using H.F. induction heating, and output is increased by 280%.

The G.E.C. 2kW Induction Heater used in this application has many features which make it eminently suitable for a wide range of applications, including the hardening of small parts, soldering and brazing. Details of the generator are given in leaflet PH 1243.



G.E.C.
H.F. INDUCTION HEATING

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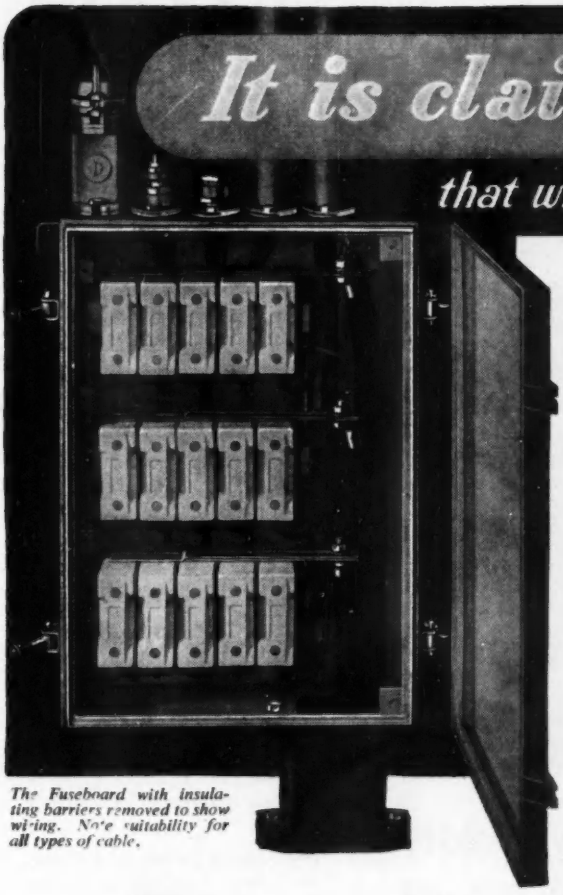
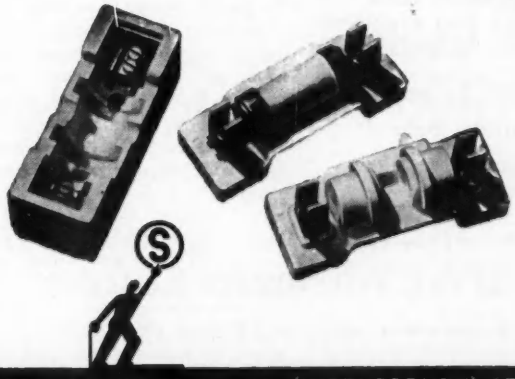
that where initial cost



The Fuseboard with insulating barriers removed to show wiring. Note suitability for all types of cable.

becomes a matter of secondary consideration as compared with wiring and installation facilities, adaptability, ease of maintenance, and ability to deal with fault currents of any severity, the Super-Sandaspeed Fuseboard is in a class by itself. The Company's qualified district engineers will be happy to discuss its many features.



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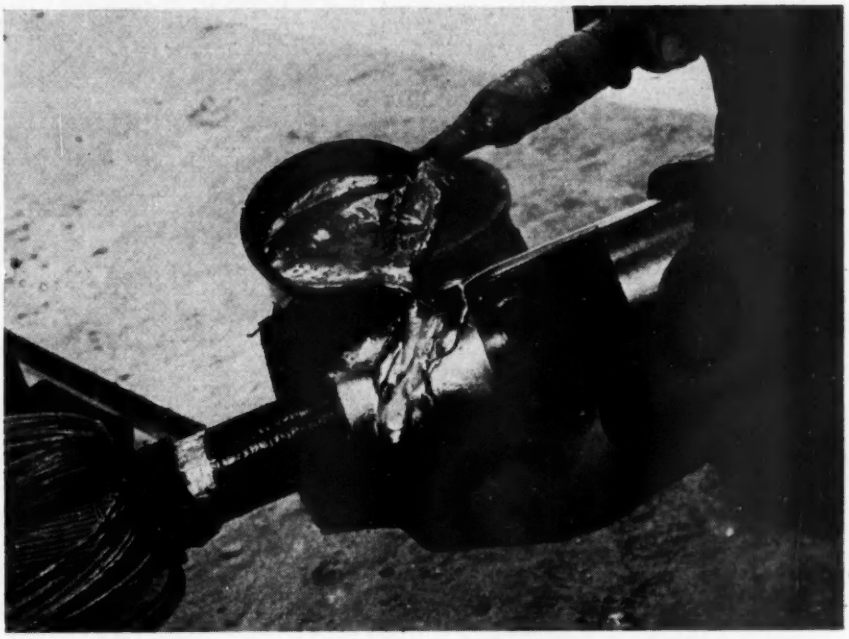

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Pouring Abbey solder prior to wiping on an 0.25 sq. in. II KV Cable

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ELECTRICAL TIMES

Volume 122 No. 3184 13 NOVEMBER, 1952

PUBLISHED EVERY THURSDAY

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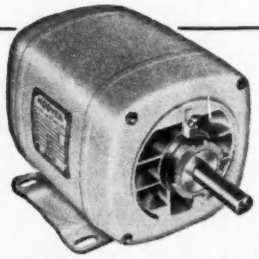

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Editorial

ANOTHER FUEL FIASCO

WE have nothing but praise for the continuing campaign for solid fuel—as a campaign. Since the war the protagonists have succeeded in putting forward their viewpoint, be the occasion small or large; they have convinced Whitehall *en bloc* of its merits and have reduced the issue to the simplest of terms so that the man in the street comes to regard himself as an expert in all fuel matters, a doughty supporter of the solid fuel cause. Now the Ridley report comes as a damping wind to cool some of these over-hot fires, but unless the electrical industry bestirs itself, this same wind will blow the flames to even greater disregard of the facts. The first public manifestation was noticeable on the wireless last week in the debate on the Ridley report, with particular reference to the domestic fire. The old technique of distorting figures to prove erroneous conclusions, which has characterised solid fuel propaganda, was still in evidence, but to avoid undue pressure from the Ridley conclusions on domestic heating, the discussion was neatly edged over to industrial heating, which occupied the greater part of the time. This was not a difficult manoeuvre, since, by chance or design, the panel consisted of three anti-electrical speakers and only one from the electrical industry. It was not surprising, therefore, that the case for electrical heating was never put, and although Sir Vincent de Ferranti made a last-minute spurt he was never near the winning post. While this discussion itself is no more than an unfortunate incident, it is the latest in a chain of occasions when the electrical industry has been out-argued, out-manoeuvred and outwitted. This cannot be allowed to continue. The time has passed when the inherent virtues of electricity were sufficient in themselves to provide the growth in load. Through commercial indolence, the present false assessment of fuel values has been allowed to develop within the country. Now an even greater effort is required and there is not yet the faintest public sign of such a move.

STATE THE FACTS

FOR instance, no one seems willing to announce in public that the high thermal efficiencies claimed for "improved" open fires—40% is a typical value—are attainable only when coke or some other smokeless fuel is being burnt. As we have pointed out before, there is not enough of such fuels available to allow them to be burnt on living-room fires; so where the millions of relatively expensive "improved" grates have been installed, coal is the fuel. What this means in terms of efficiency is related unequivocally in a paper recently published from the Government's Fuel Research Station. Even under test-bench conditions, "high-efficiency" open grates, when burning bituminous coal, are only about as efficient as older, simpler and cheaper fires. So no saving of coal can result from these much vaunted grates. The first step in any campaign by the electricity industry must be to inform the public squarely of such facts of domestic heating.

TYPES OF INSULATION

THERE is increasing agreement that the classification of electrical insulating materials into four thermal groups is inadequate for present design needs. A few weeks ago, in our report of the Imperial College Vacation School on Insulation, we noted the opinion of British engineers to this effect. Now comes a paper from a leading American engineer which discusses the same problem and reaches similar conclusions. Development of synthetic materials has so changed the overall picture in the field of insulation that the evolution of some new system of grouping is a matter of

urgency. However, an essential preliminary to such a major undertaking is the accumulation of data on the thermal endurance of available insulation. This is needed so that the new classification may be made on a basis of tested performance and intended application, instead of relating to the composition of the insulation, as at present. The American suggestions are at this stage more advanced than the British in detail, envisaging three "application" groups (separation, dielectric barrier, and physical support), and planning to relate these to specific temperature-time-strength tests. It seems not improbable that the required classification development in this country will proceed along similar lines.

SALES BY EXAMPLE

NOW that shop window lighting is permitted at the time of day when it can fulfil its purpose most effectively, a major opportunity exists for the electrical contractor. The smaller shopkeeper, anxious to keep up his sales in today's more difficult trading conditions, is potentially a good prospect for a lighting sale. Contractors cannot expect to attract this business without effort, however; a positive selling campaign will be necessary. With the Christmas buying season approaching, the time is favourable for an all-out effort by the enterprising contractor, who must be able to design a successful window lighting scheme, as well as install it. To help him, we publish this week some tested ideas on simple schemes that can be successful. Opportunity begins at home, in each contractor's own showroom: supporting every sales approach must be a carefully thought-out presentation of his own window display. The example so offered can do much to win over the doubtful retailer to a realisation of what lighting has to offer.

COAL BY PIPELINE

COAL transport charges represent a considerable proportion of the cost of coal as delivered, and any attempt to reduce them is worthy of the most careful consideration. For this reason the conference recently sponsored by the National Coal Board, on hydraulic methods of transporting coal, deserves close attention. Admittedly, the conference was mainly concerned with the movement of large coal from the working face to the shaft bottom, and from the shaft bottom to the surface. In this case one of the problems to be overcome is the degradation of the coal by internal friction. As far as power stations are concerned, however, this degradation is of little importance as new plant will in general be using pulverised fuel. Thus for those power stations which are to be sited near or on coalfields, hydraulic transportation of fuel from pithead to coal store should be an advantage. That this is also under consideration by the B.E.A. is shown by the tentative proposal to use this system at the new Bold station. Overseas experiments, both in Belgium and America, have shown that the scheme is technically possible. Its economic soundness now remains to be established.

ECLIPSE OF THE SUN

DIRECT utilisation of solar energy for heat and power has for many years exercised the ingenuity of scientists and engineers, and indeed several pilot schemes have been built, with some small success. The latest investigation into this problem has, however, shown that the imaginative notion of drawing unlimited power from the sun has no real basis. The trouble, of course, is that it is inevitable that where solar energy is at its maximum, there is little or no requirement for heat. Further, the efficiency of conversion of solar heat into power is such that enormous collectors would be required to produce even small useful outputs. A gleam of hope exists nevertheless in the use of absorption-type refrigerators using solar energy for air conditioning in tropical climates, and a suggestion is also made that a primitive type of cooker could be devised. Apart from these comparatively minor uses, the N.P.L. Committee finds that no system for power production on a large scale holds any promise.

Meteor

13 NOVEMBER, 1952

Seeing IS SELLING

Says R. L. C. Tate, F.R.S.A., expert from E.L.M.A.'s Lighting Service Bureau

THE news of the complete removal of all restrictions on shop lighting has undoubtedly led many shopkeepers to consider improving their window lighting, a course which they were somewhat loth to pursue when there seemed small likelihood of their being able to use it often enough to justify the expense. During the last few years, much progress has been made in the art of window lighting and, in particular, experience has been gained in the use of fluorescent lamps for this purpose. In spite of this, however, and in spite of the fact that more and more shopkeepers are lighting their windows, the general standard of window lighting in this country is deplorably low, with the result that many shopkeepers are getting very poor value for their lighting.

Our Responsibility

The responsibility for this rests squarely on the shoulders of the electrical industry. We are the people who have the "know-how" and it is up to us to give satisfactory service. Far too many bare fluorescent lamps are being slapped on to ceilings, or allowed to dangle in customers' eyes; we have far more efficient and convenient light sources now than ever before, but unless we take the trouble to study the rudiments of the art of window lighting, we shall do our existing customers a disservice, and lose a large number of potential customers who fail to see what benefits can accrue from the harsh and unpleasing lighting which our displays suggest as all that is available.

Shown above, "Inner Showcase" window using louvred troffers

The purpose of this article is to state some of these principles, to put forward useful ideas, and to suggest how electrical contractors can take advantage of the opportunity now offered to them.

Factors in Planning

When planning the lighting scheme for a shop window three main factors must be borne in mind—the size and shape of the window, the type of goods displayed in it, and the class of customer which is expected to use it. Lighting has only one function, to help sales, and this point too must always be remembered by the designer, for there are a number of ways in which lighting can be installed, which not only show the goods in an unfavourable light, but even attract attention away from them to the lamps themselves. An absolute rule in shop window lighting is that the lamps must be concealed from the customers' view. Unless this is done, they are bound to be the brightest objects in the field of view, and therefore, the most conspicuous. This may necessitate the use of baffles and louvres especially where more than two viewing positions are possible, but

Lighted by means of fluorescent lamps mounted at the sides, this window displayed "Liberty fabrics"

can often be achieved by extremely simple means, and is always worth taking the trouble to do.

Shop windows vary a great deal in size and shape. The easiest type to light is that in which only one side is glazed, and the observer's viewpoint is consequently limited. Here something closely approaching stage-lighting technique can be used, and the concealment of lamps and lighting equipment is comparatively easy, but unfortunately they are scarcely ever found anywhere but in large stores, and the average contractor is unlikely to be given the job of designing such a scheme.

Usual Problem

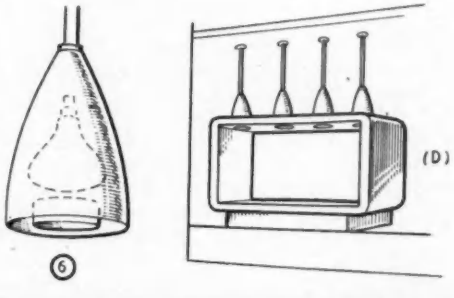
Quite the commonest type of window has the back and one wall closed, but the front and one side, generally facing an entrance lobby, glazed. Here two viewpoints are possible, so that equipment which is adequately concealed from the front is visible from the side of the window. To try and conceal all the lighting gear from both points of view is seldom practicable, if indeed desirable, but it is usually possible to screen the lamps themselves by means of cross-louvres, in the case of fluorescent, or spill rings in the case of filament lamps. It is quite common to find unscreened fluorescent lamps mounted vertically at the corners of this type of window, presumably in order to provide a bright light which it is hoped will attract customers as moths to a candle. Unfortunately, the glare from the lamps mounted in this way more than offsets their attractive value, and may even make it practically impossible to see into the window. The practice is very common in shops selling the cheaper kinds of furniture, in cheap outfitters, and in tobacconists and confectioners' shops. It has even been seen in electrical dealers' windows, where it must surely act as a deterrent to any shopkeeper who contemplates asking the proprietor to see to his own window lighting.

Where vertically mounted fluorescent lamps are used, they should be especially carefully concealed, as, owing to the fact that we have no natural method of shielding our eyes, as we have in our eyebrows where horizontal light sources are concerned, they are more than usually glaring. It is often necessary to install a raked back framing round the window inside the glass, as a flat baffle applied to its inside surface seldom gives adequate concealment. This method of installing fluorescent lamps is extremely suitable for windows displaying a large number of small objects placed very close to the glass, as in tobacconists', confectioners' and booksellers' windows.

Where there is a deep re-entrant arcade the lighting may present a special problem in that one tends to consider the arcade windows as more important than those facing the street. This frequently means that passers-by get a fine view of the lamps arranged behind the pelmets on either side of the arcade, as they look in at the ends of the windows from the pavement outside. In windows of this type where fluorescent lamps are used, it is better to discard the customary arrangement of lamps concealed behind a pelmet in favour of mounting them in louvred "troffer" fittings recessed in the ceiling.

An even more awkward problem is posed by the "open back" type of shop window which is becoming increasingly popular in the better class type of speciality shop. Here not only

(6) Reflector spotlamp in "torpedo" housing. (D) "Inner Showcase" open-back window, lighted by means of lamps in "torpedo" housings



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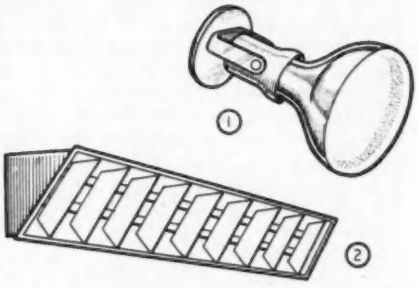
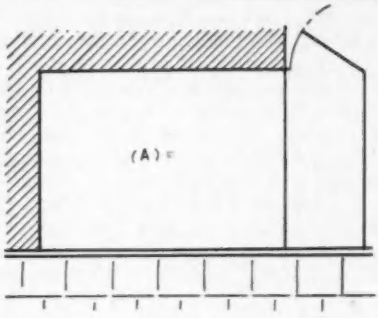
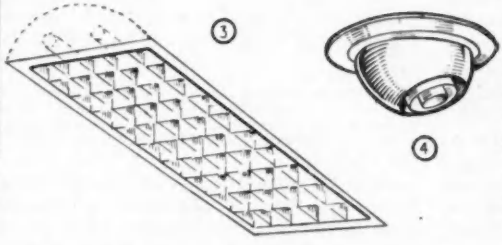
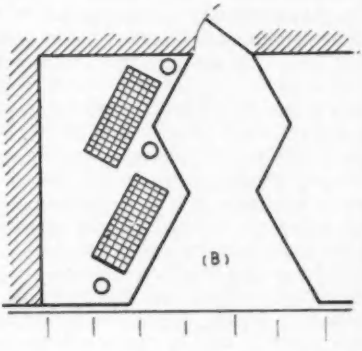




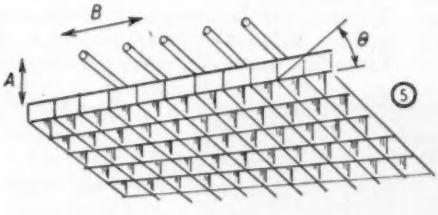
(1). 150W Reflector-spotlamp in a simple stirrup mounting. (2). Louvred pelmet fitting for two fluorescent lamps. (A) Plan of re-entrant window for which above are suitable

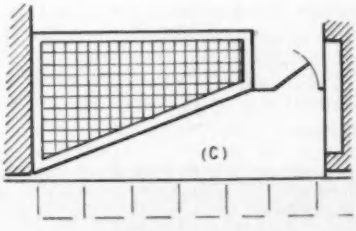




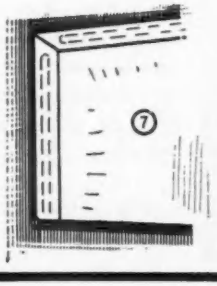
(3) "Egg-box" louvred "troffer" for fluorescent lamps

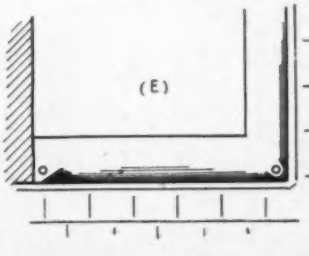
(4) "Eyeball" fitting to take 150W reflector spot-lamp. (B) Arcade window (plan) for which above are suitable





(5) Perspective section of part of louvred ceiling, showing mounting-height spacing ratio of fluorescent lamps. "B" should not exceed 1½ "A". Angle of cut-off (*i*) must be more than 30°, not greater than 45°. (C) Plan of open-back window with wedge-shaped louvred ceiling and showcases by door





(7) Detail of raked baffles to hide "framing" fluorescent lamps. (E) Plan of window lighted by means of vertically mounted fluorescents behind baffles

can anyone outside the shop see right into it, but customers can look into the shop-window from behind, and unless careful measures are taken the lamps and lighting equipment will be both conspicuous and uncomfortable to look at from the latter position. The use of louvered troffers where fluorescent lamps are concerned is a common solution of this difficulty —one also sees complete louvered ceilings installed, a somewhat more costly solution, and where filament lamps are used, various devices such as an inner pelmet between the lamps and the observer inside the shop, or lamps mounted in the soffits of a showcase in the window itself, may be used.

Filament or Fluorescent?

The question of when to use filament and when fluorescent lamps, and if the latter, which colour to choose, is becoming more and more important. The class of goods shown in the window, and the type of display preferred, must be the major consideration in making a choice. In almost every case it will be found that the addition of filament spotlamps to a window whose main lighting comes from fluorescent lamps is a great improvement, as their light not only adds highlights and shadows which tend to be lacking in the more diffuse light from the fluorescent lamps but make patches of "warm" light, which, for some classes of goods, are especially attractive. Tests carried out in the Lighting Service Bureau during the last three years, seem to indicate that the most popular light for display purposes is a mixture of colour-matching fluorescent and filament lamps, but for some classes of goods, notably glassware and tea, filament lamps alone give the most attractive light.

RESULTS OF COLOUR TESTS CARRIED OUT IN THE LIGHTING SERVICE BUREAU

Goods Displayed	Lighting Arrangement Chosen		
	1st	2nd	3rd
*Bacon (cut)	F	—	—
*Bacon (uncut)	M	—	—
Biscuits	F, C/M	F	C/M
Butter	F	—	—
Cake	F, C/M	C/M	F
*Cheese	C/M	—	—
Chocolate and Confectionery	F, D	F	M‡
Curtaining Fabrics	F, C/M	C/M	F
Cut glass	F	—	—
Dress fabrics	F, C/M	F	C/M
†Fresh fish	F, D	F	—
Furniture	F	F, C/M	N
Groceries (mixed)	F, N	F	M, N
Jewellery	F, C/M	F	—
Sauces and pickles	F, C/M	M, C/M	—
Shoes	F, C/M	M, C/M	C/M
Silver	F	—	—
Tea (dry and in the cup)	F	F, C/M	M, C/M
Toys	M, C/M	F, C/M	F

** No second or third choices were made for these commodities. † Test made before the introduction of Mellow and Colour-matching fluorescent. ‡ Then an experimental lamp.*

Abbreviations.

F = Filament lamps. D = Daylight fluorescent. N = Natural fluorescent. M = Mellow fluorescent. C/M = Colour-matching fluorescent. Where dashes are placed, no second or third choices are suitable.

Some types of goods may demand special treatment. For example, most ironmongers, cycle dealers and a great many electrical contractors tend to dress their windows with a very large number of small articles displayed on the floor, and larger ones suspended from the ceiling. Here the conventional arrangement of lighting from the top pelmet may easily fail, as only the tops of the suspended articles will be brightly lighted and much of the rest of the window will be in shadow. Lighting from the bottom of the window is an excellent solution, and one which is easily achieved by means of fluorescent lamps. If, however, filament lamps

This small window provided an awkward lighting problem owing to its lack of depth. Fluorescent lamps were mounted behind a pelmet dropped from the shelf spanning the centre of the window

are used at the bottom of the window, it may be difficult to conceal the lighting equipment.

Drapers', outfitters' and similar types of shops often put in displays for Christmas and other special shopping occasions, and it is frequently desirable to provide unusual lighting effects. This can be facilitated by the provision of socket outlets at strategic points in the window; behind the pelmet, on the floor by the glass, and at floor and ceiling level at the back of the window. By this means unsightly and potentially dangerous trailing "flexes" can be avoided.

Lighted Background

An idea which has always been effective, but has only recently begun to be widely used, is the colour-lighted window backing, the introduction of coloured fluorescent lamps having made this technique far easier and more economical than it was when filament lamps with colour screens were the only practical light-source for the purpose. An advantage of this idea is that it makes it possible to achieve a reasonably bright effect in the window for a smaller current consumption than is needed for flooding the whole window with light. It should be remembered, however, that where lighted backgrounds are employed, there is always a likelihood that the goods will appear silhouetted darkly against them, obviously a bad arrangement, since the purpose of this striking lighting effect is to draw attention to them. Spotlights trained on the merchandise in the front of the window are, therefore necessary, and if a cold colour—green or blue—is chosen for the background lighting, will be doubly effective. Flooding the whole window with strong coloured light is not normally recommended, as it is bound to distort the colours of the merchandise : where it is used, too, it often proves difficult to "kill" the colour by means of filament spotlamps unless they are exceptionally powerful.

HYDRAULIC TRANSPORT OF COAL

THE principle of transporting coal hydraulically is far from new; in fact, before the 1914-18 war, coal was pumped 660 yards from the riverside to a boilerhouse at Hammersmith. It is, however, only in the last year or so, with rapidly increasing freight charges that interest has again been aroused in this process. Experiments are already being conducted abroad, in Pittsburgh, U.S.A., where a 3½-mile-long pipeline is being used for small coal, and also in France where coal slurry is being transported three miles to a power station in Lorraine.

In this country, work is being carried out at the laboratories of the British Hydromechanics Research Association at Harlow, Essex, on the subject, and last week a two-day conference was held under the aegis of the National Coal Board covering modern experience.

Opening the conference Dr. Idris Jones, Director-General of Research of the National Coal Board stated that hydraulic transport was a process likely to be of particular interest to the coal industry. A programme of scientific research had, therefore, been devised, with the object of obtaining a sufficiently full understanding of the transport process, and of producing the consistent compendium of fact and theory which was needed for intelligent design.

If hydraulic transport of coal underground could be shown to be practicable, it might provide a revolutionary and outstandingly effective way of avoiding grave hazards resulting from production of dry coal dust.

Apart from pumping coal from the face to the shaft, the possibility of raising coal to the surface hydraulically was also attractive. The output of many collieries was limited by the winding capacity of the shaft and this could only be increased by expensive alterations. There was, however, reasonable evidence for the belief that it might be possible to pump the whole output of a large colliery to the surface up a pipe of not more than a foot in diameter.

On the surface, hydraulic transport might prove a desirable alternative to other forms of transport for short hauls in and around the pits, and it was suggested that it might also compete for longer hauls.

Although schemes were in existence abroad, they dealt with small coal. The N.C.B. was more interested in the handling of large coal—and it must not be degraded by the handling process. The Coal Board could only contemplate using hydraulic transport if it were possible to specify operating conditions which gave not only reliable and technically satisfactory performance, but also led to minimum costs.

The Conference was opened by Sir Charles Ellis, F.R.S., and those attending included representatives from the Ministry of Fuel and Power, the British Hydromechanics Research Association, the universities, gas and electricity industries, French coal and hydraulic research associations, manufacturers of hydraulic equipment and members of the scientific and production departments of the N.C.B.

Hydro Power in Jamaica

BRITISH SETS USED IN BASE-LOAD SCHEME

OFFICIALLY opened by the Governor of Jamaica in March of this year, the Lower White River hydro-electric scheme of the Jamaica Public Service Co. Ltd. is an interesting example of the electrification work proceeding in the West Indies. The station is planned for operation as a base-load unit in conjunction with three other hydro stations, a steam station, and some diesel-electric units. It is a two-floor building, containing a single generating unit of the vertical shaft type, rated at 4·75 MW, and manufactured by the Harland Engineering Co. Ltd.

Site Conditions

The station utilises the water discharged from an Upper White River power station. Due to natural underground storage, the flow is normally constant at about 180 cu secs, although there are indications that very severe floods have occurred in the vicinity of the power house. To enable power to be generated from the lower station in the event of the upper station being shut down, a bypass valve for the upper station has been included in the project.

A lined canal approximately 915 ft long carries the water to a 6 ft diameter woodstave pipe, 9,423 ft long, followed by a 5 ft diameter steel penstock, 518 ft long, which connects to the turbine. At the junction of the woodstave and steel pipes rises a 65 ft high simple steel surge tank, 30 ft in diameter, standing about 160 ft above ground level. The gross head available is 398 ft.

Owing to the high floodwater level that may be encountered, the generator floor is 18 ft above turbine floor level, and special consideration had to be given to keeping all essential electrical apparatus above flood level. Another unusual feature relates to the generator. Although initially designed for 40 cycles operation, the plant is capable of operating at 50 cycles, the proposed standard frequency for the island. This has been simply achieved, with only negligible effect on efficiency, by providing a dual-speed machine running at 480 r.p.m. and 600 r.p.m.

Turbine Shut-Off Valve

The turbine inlet is fitted with a 36 in. diameter Harland-Morgan Smith "Rotovalve" of the electric motor-operated type. This valve is of the full-bore, plug type, presenting no obstruction to the free, smooth flow of the water, the friction loss being equivalent to that of a pipe of equal length and diameter.

Turbine

The vertical shaft, single runner, Harland-Morgan Smith Francis turbine is designed for an output of 6,900 b.h.p. under 378 ft net head. As is normal with vertical machines of this make, special attention was paid to provide a simple yet robust design requiring neither gear nor belt drives off the main shaft. The advantages thus gained ensure an unusual ease of erection and maintenance.

The draft tube liner, spiral case, curb ring, bottom plate, head cover, bearing housing, gate operating ring, and pit liner are all of fabricated construction. The turbine shaft, of Siemens-Martin forged steel, is fitted with a stainless steel alcove where it passes through the packing box. The turbine runner is of cast stainless steel construction and is solidly bolted to the shaft flange. Both the bottom plate and head cover are provided with renewable mild steel wearing plates, while the curb ring is provided with a renewable cast steel liner. An interesting and unusual feature of both turbine and alternator is the self-lubricated bearing arrangement. All bearings (both axial and radial) are of the self-aligning, pivoted pad, Michell type,

requiring no external oil circulation system. There are, however, internal cooling coils fed with water from the penstock through a pressure reducing valve. Each bearing is fitted with a mercury-in-steel thermometer having an indicating instrument on the turbine panel which is mounted at alternator floor level.

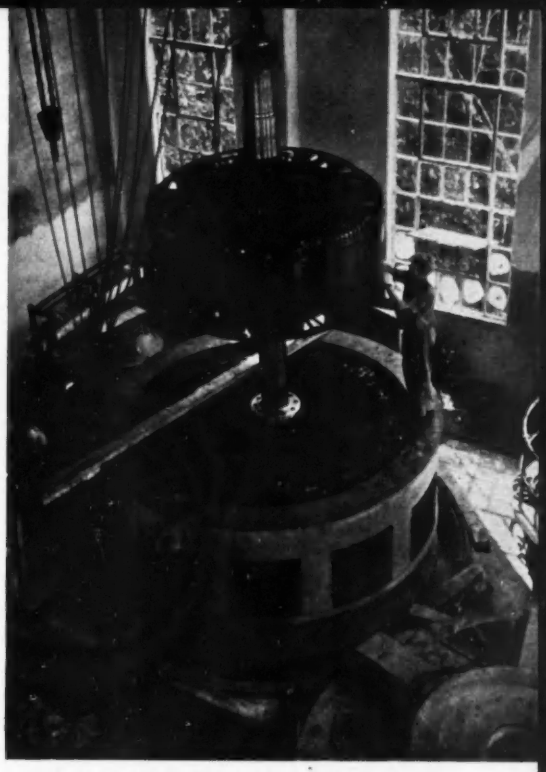
Automatic Governor

The speed of the turbine is controlled by a 10,500 ft/lb automatic oil pressure governor, which is sensitive to a speed change of 1/100th of 1%. The governor flyball head is electric motor-driven, the motor receiving its supply from a permanent magnet generator directly coupled to the main alternator. In this way the usual belt or mechanical gear drives are eliminated and the governor is located in the best position commensurate with ease of control and access.

A motor-driven speeder device enables the speed of the machine to be varied by hand or remotely from minus 15% to plus 5% of normal speed for synchronising. It is also used for loading purposes when the machine is connected to the electrical system. In addition, a speed droop (permanent speed variation) adjustment which can be set at any value between 0 and 5% of normal speed, as required by parallel running conditions, is included.

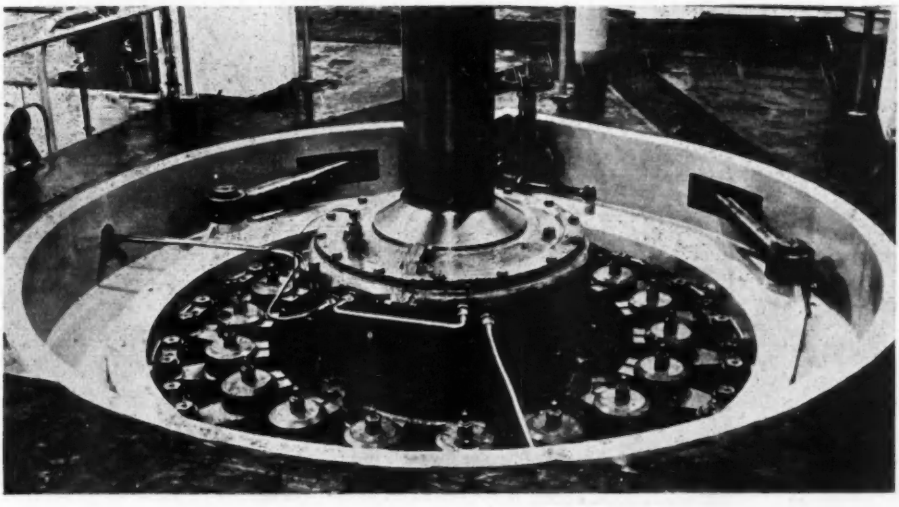
A manually-operated load limiting device can be used for starting up and shutting down the machine under hand control, utilising the oil pressure, and when no oil pressure is available the turbine may be controlled by handgear mechanically operating the wicket gates.

The turbine is coupled through an intermediate shaft to the vertical shaft, "Harland"



The alternator rotor being positioned on site

Turbine mechanism showing self-pumping water cooled bearing



3-phase a.c. synchronous generator designed to produce 5,600 kVA at 0·85 power factor lagging and 6,900 volts.

Fabricated construction has been widely used in the generator which is of the duct-ventilated type. Cooling air enters the machine from the station through both top and bottom brackets and is forced by fans, fitted to the rotor, through the radial ventilating ducts in the stator core. The warm exhaust air is collected in a duct surrounding the stator frame and discharged through ducting passing through the downstream wall of the power station.

The stator core is built up of high-grade electrical sheet steel segmental laminations which are secured to the fabricated stator frame by dovetail keys, the core being clamped between heavy end-plates.

The stator winding is formed of diamond wound, preformed coils insulated with Class B materials and treated with Haefely compound to ensure complete exclusion of air and moisture from the winding. The coils are held in the stator slots by bakelised fabric wedges and the winding out-hangs are securely braced.

The rotor hub, which is shrunk on to the shaft, is built up of thick high tensile steel plates welded together and stress relieved. The hub has dovetailed grooves to receive the poles. The underside of the hub has a finely machined face forming a brake track on which the hydraulic brakes operate.

The rotor poles are also built up of high ensile heavy steel plate and have cast steel semi-circular endpieces. The poles, which carry a damper winding in semi-enclosed slots near the pole faces, are located in the dovetailed hub grooves by tapered keys. The field coils are formed of copper strip wound on edge, the individual turns being insulated from one another. The coils are mounted on sheet steel spools from which they are insulated by Class "B" materials. The coils are securely braced by heavy V clamps.

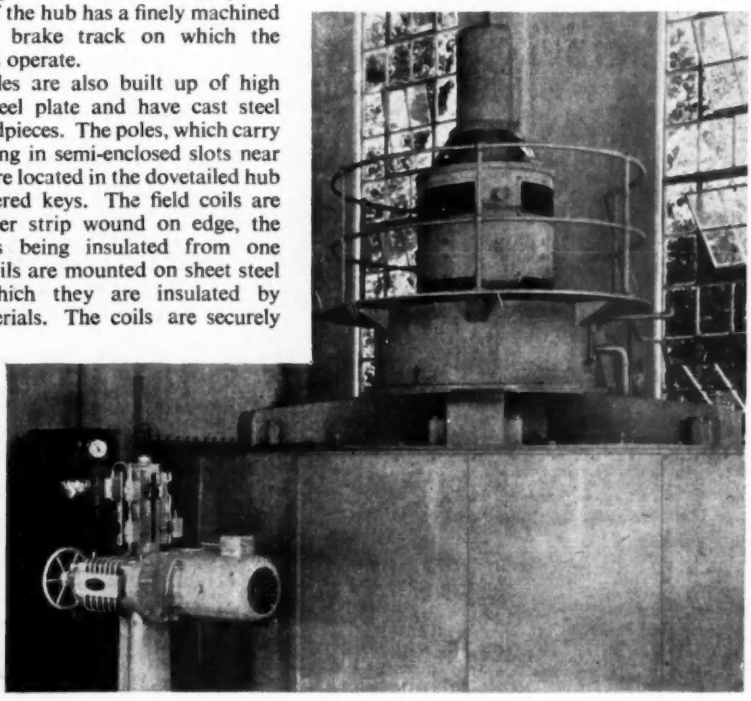
The exciter is mounted on the top bracket, its armature being built on a stub shaft solidly coupled to the main generator shaft. No separate bearings are used on the exciter.

Two cupro-nickel sliprings immediately above the exciter commutator are connected to the alternator field winding by cables passing through the hollow shaft.

Control

The plant is arranged for either manual, local automatic, or remote automatic control. Remote automatic control is the normal method of operation and is carried out by using supervisory control equipment at the Upper White River station. All supervisory orders are transmitted by impulses over 50-volt pilot cables, and alarm and trip indications are repeated in groups at the remote control station.

The project was carried out to the instructions of the Stone and Webster Service Corporation of New York, who retained Messrs. Ewbank and Partners Ltd. and Sir William Halcrow and Partners as consulting engineers for the electrical and mechanical and the civil engineering work respectively.



Close up of alternator and "Rotovalve" headstock

Our readers' views . . .

Meter Problems

THE contribution of Mr. J. Carr in your "Problems and Practice" feature, recalls to my mind two cases of "negative" units with which I was associated some years ago. A refrigerating plant in a fur store was driven by a 2-phase 4-wire motor, and the energy was measured by two single phase meters. In addition a single phase fan was connected to one of the meters. It was found that with both fan and refrigerating plant running the reading of the meter supplying the fan and plant was much smaller than the reading of the other meter, and also, that if the fan was switched off, the former would then run backwards.

In the second instance a Scott connected transformer was energised from 200 V 2-phase 4-wire mains and delivered a 230/400 V 3-phase 4-wire supply. The energy consumption was measured on the primary (supply) side by two single phase motors. While the transformer was on load the reading of both meters was correct, but on no load one meter would rotate in the reverse direction.

In both cases meter connections were checked and found to be correct and as a further check the meters were replaced but the results were unchanged. I have not been able to put forward a solution to this problem, and I should be glad if any of your readers could do so.

R.F.K.

PLUMSTEAD

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A Layman Wonders

AS a layman, I must crave the indulgence of the many experts who read and contribute to your journal, in order to air two grievances which have been with me for many years, and which I harbour against the designers in the electrical industry.

First, there is the question of street lighting. In the electrical Press, I frequently see proudly displayed photographs of newly completed lighting schemes, in which the sources of light can be seen, in all their multiplicity, curving away with the road and disappearing into the distance. With today's extremely localised light sources it is surely unnecessary and undesirable for us to have to look at lights whose illumination is being enjoyed by someone half a mile away? If one's windscreen is spotted with rain, each of these distant lights is multiplied a hundredfold, and all to no purpose. Why not screen each light so that it cannot be seen outside its own area of useful illumination? A series of pools of light, slightly overlapping along the line of the road, but whose sources are not visible from afar off, would, to my mind, be a great advance on many of the present arrangements.

Second, there is the matter of electric kettles. Even modern kettles are made with the electrical inlet placed diametrically opposite to the spout, with the result that the cable is dragged most awkwardly through 90 degrees into the vertical position when pouring. If electrical inlets are placed in a position opposite to the person who is holding the kettle, the drag on the cable is much less—I have made several, so I know this to be so. To the objection that kettles should be disconnected while pouring, I reply that most people in practice switch them off by the switch on the outlet, but do not pull out the plug. It is strange that, in these times of enlightenment and talk of "Candelas/Cm²" and "Multiple Criterion Techniques," simple things such as those mentioned are not resolved.

F. C. Harding

WOLVERHAMPTON

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Douglas Undertaking

REFERRING to your article on the Londonderry extensions, I would point out that Londonderry is not the only remaining independently operated undertaking in U.K. We share the honour (if any) as a completely independent municipal electricity supply undertaking.

C. Anderson,
(BOROUGH ELECTRICAL ENGINEER & MANAGER)

DOUGLAS, I.O.M.

ATOMIC POWER IN U.S.

LATEST move in the development of atomic energy for power purposes in America is the formation of a group of 12 companies to design a suitable reactor. Eleven of these companies are electricity supply authorities. Studies by two of the group had already established that a nuclear power reactor was economically feasible if it turned out by-products of fission as well as heat.

Power From Sewage

DUAL-FUEL ENGINES OPERATE ON SLUDGE GAS AT COLNE VALLEY

TO meet the acute need for adequate sewage disposal plant in south and west Hertfordshire in the early thirties, provision was made for a system of trunk sewers serving a centralised sewage works replacing eventually the old and overworked local plants in the Colne Valley watershed. A few years prior to the war construction of the Colne Valley sewerage scheme was started, based on a main disposal works and power station at Maple Lodge, near Rickmansworth, with two pumping stations sited nearby. After a total cessation of work during wartime, building operations were renewed in 1945, the first sewage being received at Maple Lodge in 1951.

Pumping Stations

Local conditions at the disposal site necessitated building all sludge treatment tanks above ground level. In consequence all sewage has to be pumped from ground level up to the tanks. Three pumping stations for this purpose have been built, one main station at Juniper Hill, some distance away, and two subsidiary stations at Maple Lodge and the nearby village of West Hyde. All stations are equipped with vertical spindle centrifugal pumps, dry well mounted and coupled directly to electric motors, automatically controlled by the "Noflote" system.

In the main station two-speed motors power six dry weather flow pumps each having a capacity of 4,000 galls/min and three storm water flow pumps of 10,000 galls/min capacity can be brought into use as required. Provision for three extra d.w.f. pumps and a further s.w.f. pump has also been allowed if it becomes necessary to increase the total capacity. At the other two pumping stations the pumps are in units of 1,000 galls/min capacity and operate at constant speed. All are powered and controlled from the power house at Maple Lodge, control information being transmitted from the pumping station and displayed on a mimic diagram panel showing pumps in operation and sewage level.

Power Plant

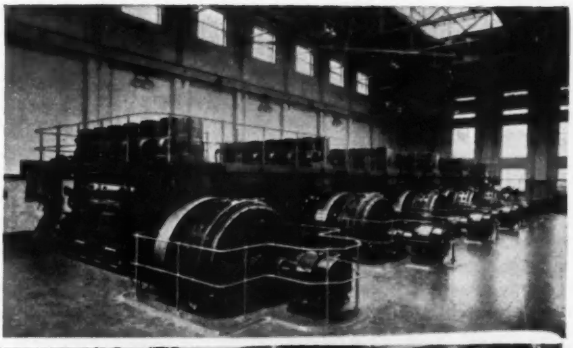
Power for these pumps and all other requirements of the plant is obtained from six Crompton Parkinson generators driven by National dual-fuel engines—the first installation of this type of engine. These engines, each developing 666 b.h.p. when operating normally aspirated, can be fired on fuel oil alone or mixtures of fuel oil and sludge gas obtained from the sewage containing as much as 85-90% sludge gas.

To allow the engines to run on this dual

Heading block shows view of sludge treatment plant with the power house and administration building in the background.

mixture, each cylinder has a double inlet valve so that air and gas are kept quite separate. Operating gas pressure is 0·5 in. w.g. reduced from approximately 4 in. w.g., at which pressure it arrives at the power house. To meet heavy demands for power likely to occur during storm conditions, any two engines can be operated as pressure-charged diesel units, being supplied with air at 4·2 lb/sq in. g and this arrangement obviates the need to start up an additional engine at short notice.

Engine instrumentation is provided for in a panel for each engine, on which is mounted, in addition to the usual indicators, exhaust temperature indicators and an electric tachometer incorporating an overspeed shut-down relay. An alarm panel, on which are mounted a klaxon horn, indicating and flasher lamp and alarm controls completes the picture of engine operating conditions.



Inside the power house showing the National dual-fuel engines and Crompton Parkinson 750 kVA alternators; (Bottom) Some of the pumps in the basement. In the foreground is an emergency booster pump for fire services and beyond the ladder are secondary effluent water pump and associated heat exchangers

Electrical Installation

Power is generated at 3·3 kV, 50 c/s, each alternator having an installed capacity of 750 kVA. It is used for sludge and sewage pumping, driving air compressors for aerating sludge, lighting and numerous other mechanised processes at the site. Control is effected by metal-clad oil-immersed switch gear incorporating duplicate bus-bars. Motor speed is also controlled from this panel to facilitate synchronisation and regulation. The turbo-compressors are driven from 3·3 kV motors and power at this voltage also is fed by cable to the external pumping stations and the sludge filtration and drying plant. Other services are at 415/230 V.

The heating system utilises waste heat from the diesel engines, which is divided into two independent circuits. High-grade heat from one circuit is used mainly for domestic and room heating in the site buildings, with a standby oil-fired boiler should the engine waste heat prove insufficient for all demands. Control is automatic, maintaining the water temperature at 180°.

The more important use of waste heat is provided in the low grade circuit which is used to maintain the temperature of the sludge digestion plant at an optimum level of 85° F.

Starting compressed air receivers in power house annexe. On the left are the electrically driven superchargers

NOTES ON WIRING *by Megohm*

Services for Schools

THE minimum electrical services for modern schools include lighting, socket outlets for general utility purposes, single phase power circuits for time clocks, radio, staff call and fire alarm systems, outlet points for electrical equipment in the kitchen and 3-phase power circuits for circulating pump motors, etc., for the hot water and heating services.

The general constructional layout for modern schools is on one floor spread over a relatively large area and it is therefore desirable that the electrical intake is placed in the centre of the area and preferably adjacent to the assembly hall, kitchen and boiler house, where heavily loaded circuits are generally located, and space is provided in the wings for housing local distribution equipment. The main switchboard should comprise main switch fuse units controlling outgoing sub-mains to the sub-distribution centres or one main switch fuse controlling a sub main distribution board for the lighting and single-phase power circuits with a second main switch fuse controlling a sub-main distribution board for 3-phase power circuits could be an alternative control and distribution arrangement.

From local distribution boards, circuit wiring comprising v.r.i. cables drawn into a heavy gauge screwed welded conduit system concealed in the structure is generally adopted. In conduit systems laid on roofs it is important to see that there is maximum coverage to minimise the risk of condensation troubles and where possible it is preferable from all points of view that the conduits are laid on the shuttering and cast into the roof construction.

Lighting

Lighting in general and especially in classrooms should be bright and cheerful and the illumination on the working plane (desk level) should be even. It is also necessary that the lighting fittings selected should be of pleasing design, efficient and easy to clean and allow sufficient light to fall on the ceiling and walls. Tungsten lighting fittings with the lamp enclosed in an inverted jar shaped opal glass shade give satisfactory light distribution plus a little more light on the working plane than that given by opal spheres. Recommended illumination intensities in lumens per square foot are for classrooms 12, assembly halls and dining rooms 8, staff rooms 6 and cloakrooms, lavatories, corridors and stairs 3. The switching of the lighting fittings should be arranged so that the fittings farthest away from the windows may first be brought into use as daylight fades and the switching of lighting fittings in assembly halls, dining rooms, corridors, cloakrooms, etc., should be grouped in suitable positions out of reach of children.

Socket outlets are required in every room and corridor to enable the full use of electrical equipment to be enjoyed for occasional heating and general utility purposes and may be connected to ring circuits.

Time clocks will be required in classrooms, assembly halls, dining rooms and staff rooms and should be connected via fuses to the live side of the main switch so that supply is not interrupted if the main switch is "opened." This condition will also be required for essential day and night services to refrigerators and thermostatic control circuits, etc.

Radio and Signalling

Radio and staff signalling systems will comprise a radio, amplifier, gramophone turntable, etc., with loudspeakers positioned in all rooms wired to receive 2-programme radio, and a 2-way staff call system consisting of an audible and luminous call indicator with a multi-push control unit positioned in the Head Teacher's room connected to buzzer and cancellation switch points in each classroom.

The fire alarm system (battery operated) with loud ringing bells and fire alarm break glass pushes located at strategic points in the corridors will also be connected to an indicator positioned in the Head Teacher's room to enable the source from which the alarm is made to be automatically indicated.

Power circuits for circulating pumps, thermostatic control equipment and electrical equipment in the kitchen call for no special attention other than it may be desirable that the conduits should be galvanised. In addition to the foregoing in the general layout provision should also be made to enable wired television circuits to be installed in all rooms at a later date.

HEAT FROM THE SUN

Possibilities of Solar Radiation as a Power Source

PROBABLY all energy (with the possible exception of nuclear energy) used on Earth has its origin in stored products derived by photosynthesis or from solar radiation. Examples of the first type include coal, wood, and probably oil, while examples of the second are hydro-power and wind power. Attention has lately been focused, due to the possible exhaustion of present power sources, on the possibility of utilising direct solar radiation. A Committee, formed under the ægis of the National Physical Laboratory, has recently issued a report on this subject. The terms of reference of the Committee were "to investigate the possibilities of utilising solar energy and to recommend whether research work should be undertaken or sponsored by the Department of Scientific and Industrial Research." These terms of reference were interpreted as being confined to using solar energy fairly directly and not in the form of wind or water power.

It is not very surprising to find that the conclusions are not favourable. To quote the report: "When in doubt we have taken an optimistic view, but even so our conclusions are not encouraging. It seems unlikely that solar energy can be an important source of heat or power in the near future, although some applications may be possible in specially favourable circumstances. In particular, it is possible that the availablility of very modest amounts of power would have important and beneficial effects on the economy of tropical agricultural areas."

Available Energy

In arriving at these conclusions, the Committee carried out an extensive investigation into all existing data relating to the problem. The first and most important figure is the amount of heat in terms of energy arriving from the sun. This was taken on the average as 1·35 kW/m² at the outside of Earth's atmosphere. When the question of heat received at the earth's surface is considered, the figure is much reduced, and although the rate of receipt of energy may reach 1 kW/m², in most places it will not average more than 0·1 to 0·2 kW/m². It will of course be zero for more than half the time.

It is perhaps an ironic fact that the economic value of hot water depends largely on its temperature and the quantity used. For domestic purposes, water is required at 55°C, and with an ambient temperature of 15°C this needs a rise of 40°C. If 200 litres/day is taken as representing the reasonable requirements of a household in a temperate country, an average provision of 0·39 kW is required. Taking the efficiency of a solar radiation collector as 60%, and the average receipt of energy as 0·09 kW/m², the area of the collector will be 4·3 square metres. This would provide too much summer heat, and too little winter heat, and would require to be supplemented by a fuel burning system. Practical results are even less favourable than these figures suggest, and there is no prospect of substantial improvement of existing equipment by research and development. Similar considerations applied to house heating.

Cooking

On the question of cooking, it is thought that it might be possible to construct a solar stove which could satisfy part of the needs of the inhabitants of India, whose main meal is at midday and generally consists of some form of boiled rice or lentils. It should be possible to reach and maintain temperatures of boiling water with 100 watts, which could be collected by a mirror only 0·3 square metre. A stove using a mirror and pressure cooker has already been built by the Indian N.P.L. but it is not certain that the machine can be built at a price that can be afforded by the Indian villager. The Committee, however, recommends that a contract be considered by the National Development Corporation for the design of a stove which would be suitable for large scale production.

A possibility also investigated was the use of an absorption type refrigerator cycle for air conditioning; here the Committee considers, once again referring to optimum conditions as in India, that using an ammonia absorption machine, a roof area of 200 sq metres will be required to cool a building measuring 20 by 20 by 10 metres high. This can be reduced for the lithium bromide-water cycle.

On the question of power, it was thought that even under best conditions, using known heat-power cycles, the mirrors required would become unduly large. Direct generation, using

the three known methods, the thermo-electric effect, the photo-voltaic cell and the photo-galvanic effect were also discussed. In the first case the efficiency of conversion of absorbed heat into electric power was about a quarter of the thermo-dynamic efficiency, or rather less than that of a small steam engine working between the same temperatures. Other serious technical difficulties are also involved. Photo-voltaic cells, using sunlight, have a sunlight efficiency of about 0·53% and as far as photo-galvanic cells are concerned, the little that is at present known about them does not make it appear likely that they could be developed into an efficient power source. This is in spite of the fact that it is in principle possible to construct a photo-galvanic cell in which a chemical change is stimulated by sunlight, and which in consequence produces electric power.

Fuel Production

The efficiency of the utilisation of sunlight by growing plants is remarkable. The rate of storage of energy in the wood of an Indian eucalyptus forest is about 1·6 W/m^2—about 0·8% of the energy reaching the ground. With sugar cane, this figure can be improved to 2 W/m^2. Burnt in a steam engine with a boiler efficiency of 70% and an engine efficiency of 14% the output would yield about 0·15 W/m^2 of eucalyptus forest. No particular object, it is felt, would be served by the conversion of wood into alcohol due to the large proportion of waste. It would, however, seem practicable to use a wood fired steam engine for irrigation as the amount of land required for growing wood works out at about 1/50th of the area irrigated.

An interesting comparison is made between steam power and Indian bullock power. The bullock can probably work at an average output of 80 watts for a 24-hour day. Food intake, in terms of power, is about 1·5 kWh. The efficiency, therefore, is about 5%.

Forests for Power

The committee concludes that to produce 10 MW with a power station having an efficiency of 32% would require 20 km^2 of forest, which could yield every year enough wood to fir· the power station. While the project does nct appear attractive, it is not entirely impracticable. Widespread use of plants as a power source, would, however, require such a large area of ground as seriously to affect the area available for growing food. It is conceivable that higher rates could be achieved by breeding plants specially for high rates of production.

It has been suggested that some form of plant could be grown in tanks and continuously withdrawn and burnt or fermented to alcohol. The efficiency of the photo-synthetic process, in systems of this kind, is, however, in doubt, and authorities vary between 25 and 65%. Assuming a figure of 30% of the available energy is used, with a transforming efficiency of 25%, an overall efficiency of 7·5% is available. Drying the plants will take about 33% of this residual energy, and conversion into power at a station efficiency of 32% will give an output of 3·2 W/m^2. Fermentation of the plants to alcohol or methane is also possible, and perhaps more convenient, but it would yield substantially less power.

A closer analysis of the problem, however, shows that from a practical view the scheme is uneconomic, and on present evidence it does not appear that any substantial progress can be made. If at some future time, the cost of fuel becomes much greater than at present, such possibilities might require serious consideration.

There is scope for the solar distillation of water for drinking purposes in certain tropical areas, and there is also considerable scope for a combination of solar heater and thermal pump. This system would enable almost complete recovery of the latent heat of condensation and would greatly increase the output for a given size of plant.

Conclusions

There is at present no way in which the use of solar energy can make a large contribution to our sources of power, and no line of research and development can be suggested that is likely to lead to a way in the near future.

Energy for domestic hot water heating can in favourable circumstances be obtained and there is scope in certain tropical areas for the distillation of water using a combination of solar heater and thermal pump. The Committee recommends that a cooking stove, utilising solar energy and suitable for large-scale production, be designed.

The development of air conditioning equipment driven by solar power is worth consideration as is the design of a flat-plate collector for driving a small engine.

A small steam engine of high efficiency using wood or other plant material as fuel appears to have substantial advantages over power derived from animals for pumping water and driving light machinery. The development of such an engine is desirable and is being undertaken by Messrs. Ricardo for the National Research Development Corporation.

Remote Indication

An Impulse Frequency System Described at the I.E.E.

A TELEMETERING system based on variable frequency was discussed in a Measurements Section paper, "Telemetering for System Operation," by MESSRS. R. H. DUNN and C. H. CHAMBERS, at the Institution of Electrical Engineers, last Thursday. The system outlined is based on electronic techniques and lends itself to single channel working for maximum economy in bandwidth and line rental.

Information for power system operation required by a control engineer must indicate magnitude and direction of power flow and trends of system load and frequency. To transmit this intelligence a communication system has then to be established as a shadow, as it were, of the power network. Information must first be sent to a group control centre which will require extensive displays of conditions existing in its area. Each group centre will also provide for summation of much of the detailed information so that in this form it can be transmitted to master control which will then have a complete and accurate picture of conditions existing over the whole system.

Telemeter System

Frequency-impulsing, unaffected by the carrier channel, would appear to be the most satisfactory basis for telemeter transmission. This method can be used over a speech transmitting circuit, enabling the telemeter system to use one channel for several meter signals transmitted. The important criteria are, however, flexibility, stability and continuous operation and the method suggested is based on pulses generated by integrating meters of the watt-hour type, derived from contacts on a rotating disc.

Pulses so generated can be integrated over intervals of time, but it is preferred to measure average impulse frequency directly and electronic circuits have been developed for this purpose with considerable improvement over pulse-count methods. Integrating meters as a source of impulses provide an accurate means of determining active and reactive power and can be adapted to indicate voltage and current.

Basically, the electronic telemeter is a device which produces a voltage related to the frequency of impulses applied to it. Using a straightforward circuit, a nearly linear response can be obtained, having a first-order error about 0·5%. When used for indicating interconnected loads, this telemeter requires certain modifications to meet the somewhat different requirements. For summation purposes, further modifications enable the telemeter to use output voltages derived from other telemeters, for adding, subtracting, and providing indication of the final summation with approximately the same accuracy.

Measurement of Level

Static quantities can be measured by translating them into a voltage which is used to govern the frequency of an impulse generator, using, again, a circuit based on that of the standard telemeter. Two other devices are available in this system, and derived from the basic circuit. One is a differentiator, indicating the rate of change of telemeter impulses and the other an accelerator which is designed to speed the response of other telemeter indicators, although at the cost of accuracy. These different telemeters all have the useful property that they can be constructed from similar components and hence lend themselves to standardisation.

Renting channels over which such intelligence can be transmitted forms at present a major item of expenditure. Economy can be effected by using one channel for several telemeters. Information thus presented is continuous, each meter being coded by a multiplex teleprinter. A common sender can provide each telemeter signal with its appropriate code, which will automatically operate the appropriate telemeter at the receiving end. The number of telemeter signals which can be sent down any one channel will depend upon the impulsing rate, increasing as the rate is reduced. As the combined impulse speed of several signals will be increased electronic equipment will be required to handle the information and recent developments in cold cathode tubes have provided a means to obtain equipment with high reliability and long life.

Overall performance of an impulse-frequency telemeter depends largely upon the range of frequencies used. The impulse rate affects the time response of the meter but, due to long time constants in the circuit, its response to instantaneous changes will necessarily tend to be slow. Of more importance, however, is

response error which is the error of the telemeter when following the continuously varying conditions likely to be met in a power system.

Telemetering Applications

With little difficulty the impulse-frequency telemeter can be applied to all electrical quantities required in a system control centre. It can be used to indicate, with either individual watt-hour meters or mechanical summators, the output of generating stations. Moreover, the outputs of several telemeters can be summated by paralleling their output currents. This can be performed for either single direction outputs, or two direction outputs indicating either negative or positive values, i.e. an intergroup load exchange.

When direction as well as magnitude has to be measured, a watt-hour meter is available which can be adapted to single relay technique, although direction is transmitted separately to pulse rate. The measurement of voltage or current control can be made with an integrating meter giving a pulse output proportional to the square of the quantity and necessitating a modified indicating instrument at the receiving end. Finally, with a new type of rotating frequency meter, a frequency range of 45 to 52 c/s can be translated into an impulse-frequency output varying inversely with this change, and adding a differentiator to the indicating telemeter enables rate of frequency change to be measured.

DISCUSSION

Opening discussion on the paper, MR. F. J. LANE (B.E.A.) considered, as a side issue, other possible carrier channels for telemetering. These were briefly power-line carrier and radio, but neither was really suitable in this country, although the latter might commend itself for emergencies. On the paper itself, he pointed out its general implication, namely the extensive development of communication technique which had taken place during the last decade. He felt, however, that the author's assessment of other methods had been somewhat casual, nor did they give due credit to the development of initial apparatus from which the impulse-frequency method was evolved.

MR. N. C. SMART (G.E.C.), speaking as a manufacturer rather than user, desired further information on the ability of the equipment to indicate amperage and voltage, although he felt that this system went a long way to meeting all demands on telemeters. He also wanted some indication of the system's accuracy when all other errors were taken into consideration. Many speakers discussed, from different aspects, the alleged 0·5% accuracy of the telemeter and what effect internal influences would have on this.

Considerable interest in cold cathode tubes was shown by MR. R. E. MARTIN (B.E.A.), who discussed their high reliability and long life. The disadvantage in the use of cold cathode tubes was the high voltage h.t. supply required and he suggested ways of obtaining this if the supply failed.

MR. W. BRITTLEBANK (Merz and McLellan), felt that insufficient attention had been paid to "reversed" telemeter generators which converted a static level into a series of pulses. For hydro sources this was of considerable importance, as was also the possibility of remote telemeter loading of hydro generators and he questioned whether the response was sufficiently flexible for different machines. A solution he suggested was increasing the pulsing frequency to 200 impulses/sec but without operational experience there was no obvious remedy.

COLD CATHODE TUBES

APPRECIATION of the advantages in using cold-cathode tubes in certain applications was shown at an informal discussion held by the I.E.E. Measurements Section last week. Introducing the subject, "Circuit Applications of Cold Cathode Trigger Tubes," Mr. K. Kandiah outlined briefly the major differences between thermionic and cold-cathode tubes. Whereas the former provide a means of obtaining continuous control, the latter are available only as a form of switch operated by a suitable electrical impulse.

Despite this possible objection, which could be overcome, considerations of reliability indicate that cold-cathode tubes should be used wherever possible. Moreover, the simplicity of circuitry associated with these tubes when used for counting and sorting electrical impulses lends weight to previous arguments supporting their wider application in electronic circuits.

There is little doubt that the major drawback to the use of cold-cathode tubes is unsatisfactory ionisation and de-ionisation, of which the latter presents the more serious problem. Little is known of the mechanism by which the discharge is satisfactorily quenched, and at present external circuits are used for this purpose.

In the ensuing discussion, several speakers spoke favourably of the absence of filaments and consequent saving in power required, although these tubes generally require higher anode voltages. A knotty problem which several speakers attempted to untie was that of quenching. One way in which this could be accomplished appeared to result from the addition of an auxiliary cathode between the main cathode and trigger electrode, maintaining between the latter and the auxiliary cathode a stable continuous discharge.

Electricity and Public Works

ELECTRICAL ITEMS SHOWN AT OLYMPIA

IT was perhaps a little disappointing to see the comparatively small use of electricity shown on the machines exhibited last week at the Public Works and Municipal Services Exhibition at Olympia. Further consideration, however, shows there is good reason for this. Most of the equipment, lifting and handling plant, earth removal equipment, concrete mixers, road making machinery and so on, has to operate on sites which initially are remote from easy access to mains supply. Consequently electrically operated plant has to be powered from mobile generating sets—an added capital expenditure—or, in the case of large schemes, special arrangements must be made to run power lines or cables to the site. This does not imply that the Exhibition was devoid of electrical interest, but in the main, electricity is used solely as an alternative means of providing motive power, the majority of the equipment being arranged either for oil and petrol engines or, where required, electric motor drive.

Generating Sets

In view of the above, the main electrical interest centred around the mobile generating units of which there were several on view. Hampson Industries Ltd. offer a range of diesel generator sets, from 3 kVA to 140 kVA and petrol driven sets from ½ to 30 kVA. These can be made to customers' requirements, and can be supplied complete with switchboard and synchronising panel for parallel operation. The engines and generators, in this case, are bought out and the customer can specify the manufacturer if desired.

From the Brush Aboe Group are several units. The M.4. "Seven Star" diesel set, has a McLaren 88 b.h.p. 4-cylinder diesel engine coupled to a Brush 55 kW 400/440 volt. alternator. National Gas and Oil Engine Co. had a 50 kW entirely self-contained set using an "M4A3" engine with a Brush generator. This standard unit is in quantity production for immediate delivery and is complete for immediate installation. Self-contained plant was also being shown by A. C. Morrison who had a 17 kVA totally enclosed a.c. plant developed specially for contractors and civil engineers. To replace the petrol driven generating sets, supplied as standard on many American excavators and earth moving plant, are some 1½ to 2½ kW air cooled 110 volt d.c. units with push button control. The David Brown diesel engine has been incorporated in an 18 kVA set manufactured by Dale Electric (Yorkshire) Ltd. This set is designed to meet the power and lighting requirements of a small works or to serve as a standby unit. The alternator is of the self regulating type and will maintain voltage at ± 2½%. Sentinel (Shrewsbury) Ltd.,

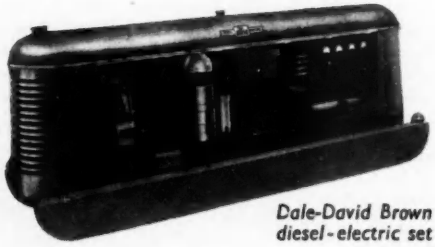
E.D.A.'s stand shows the skeleton house designed to illustrate the ring main system

also showed alternator sets rated at 50 and 22½ kV. The latter can be fitted with a clutch for industrial use if required.

Lighting

Street lighting equipment was not particularly conspicuous. Automatic Telephone and Electric Co., exhibited their "Rythmatic" ripple control system and had a working model of the "Electromatic" system of vehicle operated road signals, while the Horstmann Gear Co. showed their well-known range of electric time switches for street lamps. Street signs were being shown by Bergo Ltd., Gowshall Ltd., George Pike Ltd. and I.R.S. Ltd. These stands amply displayed the regimentation now introduced to control, divert and sometimes confuse the motorist.

On the domestic side, little was to be seen from the electrical angle, although the gas industry had several exhibits. E.D.A. had an excellent stand on which the most prominent exhibit was a skeleton model, half full-size, of a house of two floors completely wired for electricity. The runs of conduit to the electric cooker and water-heater and to the switches, ceiling-points and an adequate number of 13 amp fused plugs and sockets wired on the ring main system were all clearly visible.



Dale-David Brown diesel-electric set

Municipal housing interests were well served by a laundry unit evolved to solve the problem of communal washing on Council housing estates. This attracted considerable attention, and appears to be a real requirement in the view of many of the authorities concerned with municipal housing. Displays were given illustrating the savings made possible by the lagging of hot water systems, and a series of enlarged photographs drew attention to municipal application of electricity such as electrically-driven pumps for sewage, battery-electric vehicles for sewage disposal and street cleansing, and trolley buses for transport.

A certain number of domestic appliances could also be seen on the stand of Bratt Colbran Ltd., who showed their Solectra range of appliances. This included panel fires, convectors, radiators, overhead heaters and hotplates.

Auxiliary Items

Portable collapsible canvas shelters, and jointers, and cable layers' tents were shown by John Smith and Co. Ltd. Believed to be the first of its kind ever exhibited was a completely collapsible mobile site office or caravan specially designed by Charles A. Preece, Ltd. When assembled it has overall dimensions of 18 ft long by 7 ft 6 in. wide by 8 ft 6 in. high. Weighing only 32 cwt, it can readily be towed by any 18 h.p. car or lorry and provides a completely fitted office and/or sleeping quarters for supervising staff. When dismantled for shipping, it packs into an exceedingly small space, and only a spanner and screwdriver are necessary for assembly. For use at night and in special emergencies are the "Geopi" engine generators and floodlighting sets. A large range of portable electric tools and floodlights are now available from George Pike Ltd. for use with these popular units.

Radio sets, particularly of the walkie-talkie type are now becoming increasingly popular for communication between outlying working teams and central headquarters, and a recent estimate shows that the number of stations operated by transport, water, sewage, gas, electrical and other public utility services probably exceeds 500, an increase of about 80% in not much more than a year. Contractors are also showing interest in this field for communication with their agents on site and for giving instructions to drivers of cranes, tractors, bulldozers and lorries. To cater for interested parties, Marconi were demonstrating walkie-talkie units within the exhibition hall, and outside a radio-equipped car was taking prospective users on "radio" rides round the building.

Road Accidents

The problem of road safety was well shown at the D.S.I.R. Stand where a model indicated how poor rear lights were indistinguishable to a driver faced with an approaching headlight. Poor rear lights, it was emphasised, were the cause of some 3,400 casualties per year—about 9% of all night casualties—and the resulting economic cost to the country is about £2 million per year. Reliability tests had been carried out on popular makes of cycle rear lamps which had a failure rate of 3·5 per 100 night journeys; 75% of the failures were due to bulbs becoming faulty or the battery running down, and the remainder were due to mechanical trouble or faulty contacts.

PROBLEMS AND PRACTICE in Engineering

Lamp Height Adjuster

ON some machines used in engineering plants, general lighting only is necessary for the major part of the time that the machines are in operation, owing to the fact that the machines work automatically and no adjustment or precise setting work is necessary. Cold-heading or bolt forming machines are a typical instance of machines which can work automatically for several shifts without attention. An enamelled iron shade, similar to the one illustrated, can supply sufficient general illumination for the machine. Such lights have to be suspended from the ceiling as there is no space available for mounting them on the actual machine frame.

This photograph illustrates the simplicity of adjusting lamp height

When dies have to be changed and the machine re-set for another component, it is useful for the setter to be able to bring the light close to the machine. One simple arrangement for allowing the light to be suspended at any desired height is shown. The lead for the light is of sufficient length, when extended, to permit the shade to be dropped to floor level. Threaded on to the flexible lead is a piece of 3/16 thick plywood drilled with two holes which are a close fit for the lead. By adjusting the length of the loop formed by the lead, the lamp can be set at any desired height. The plywood acts after the fashion of a runner on a tent guy rope and locks itself to the lead without the danger of slipping.

The runner illustrated, can be hung from any convenient point by means of the hook fitted therein. This is useful where ceilings are low. Another use is when temporary lighting is to be rigged in a working place. Long leads on the lights, together with height adjusters enable the lights to be used in widely varying situations.

Where workshop lights are suspended from high ceilings over machines, as mentioned earlier, the wire hook can be dispensed with and the weight of the light and lead taken by the ceiling fitting. The runner or adjuster will still lock itself efficiently to the lead and will permit the light height to be adjusted by altering the length of the loop.—*C. T. Bower.*

Negative Units

NO doubt, in the deductions drawn from his very interesting experience with a wrongly connected polyphase meter, Mr. Carr purposely omitted one or two small points for the sake of simplicity, but I think they should be mentioned in the interests of accuracy.

The points I have in mind are: (a) V in the equations is line to neutral voltage, and (b) the current does not remain at its original value, say I, when p.f. correction equipment is switched in. In the example quoted it would fall to 0·64 I (I cos ø) and so the last expression should be:—

$$3\ V\ I \cos \phi \cos 120° = -0.96\ V\ I.$$

This neglects any power loss in the correction equipment.—*R.A.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

LIGHTING RESEARCH

Benjamin Electric Co., Ltd., open new research building and Laboratory at their Tottenham Works in London

Above is the 12-ft. photometer integrating sphere

RECENT pronouncements on productivity have emphasised the importance of research particularly in the development field. It was with considerable interest, therefore, that we visited last week the new lighting laboratories established by Benjamin Electric Ltd., at their Tottenham works. It should, at the outset, be pointed out that these laboratories are primarily designed for productive and development testing and are not engaged in fundamental research.

Building

The new building, designed by Messrs. Charles M. Swannell and K. F. Templeman, in close co-operation with the company's staff, consists of engineering, administrative and design offices; a prototype workshop and stores; the main laboratory with an area of 2,000 sq ft and a height of 22 ft, and several smaller test rooms of a specialised nature. As can be seen from the accompanying photographs, the main laboratory is particularly open and spacious, although it can be blacked out completely when certain tests are required.

An interesting feature is that the floor, of chequer board pattern, is divided by the pattern itself into 3 ft squares, and each square is again subdivided into 1 ft squares, thus permitting the easy measurement of distances in a horizontal plane.

Equipment

One of the essentials in a laboratory devoted to lighting measurement is the establishment of sources of constant voltage. In this laboratory, a central switchboard, complete with voltage stabilisers and rectifiers, provides both a.c. and d.c. supplies to all parts of the building. Transformers can be used to give the necessary voltage ranges.

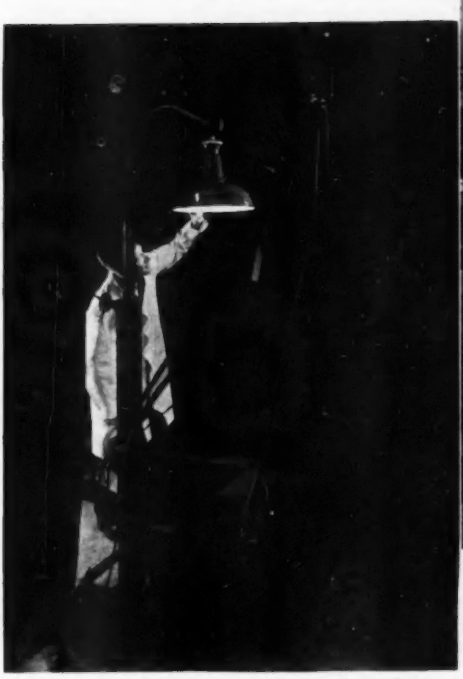
The most prominent item is a 12 ft internal diameter integrating sphere which is used for the calibration of working lamps against lumen standard lamps. It also gives the light output ratio of a fitting and its lamp, compared to the bare lamp. Thus the reflecting surfaces of similar fittings can be compared, and routine checks can be made on the reflection factor of production fittings.

Two photometers are provided, one giving values of illumination in the horizontal plane and the other to give intensity curves in any vertical plane. In the former, the lamp can be mounted at various heights, the intensity being measured on the floor by a photo-electric cell, and corrections applied for cosine response. The latter uses an ingenious mirror and photocell system which can be rotated vertically round the fitting from a separate control room in which measurements are taken.

For testing fittings for suitability under various ambient conditions a thermal and humidity test room is provided which can also simulate heavy or light rain conditions. This can also be used for carrying out life tests on materials and finishes.

It is important in fitting design to ensure that no undue heating of the fitting components should occur, either due to the passage of current or due to the heat from the lamp. Accordingly, a further draught-free room has

Below is a photometer for deriving spherical readings, and right is the laboratory switchgear and control panel



been built and equipped with the necessary equipment to measure temperatures within the fitting by means of thermo-couples. This room can also be temperature controlled to simulate various ambient conditions.

Other working equipment available includes a standard optical bench for calibration of sub-standard lamps against standards, the calibration of lightmeters and photometers and the calibration of neutral and coloured filters.

Outside the main laboratory, there is an instrument and electrical test room which can be used for the standardisation of electrical measuring instruments used both in the laboratory and in the factory. This room is also used for investigating the characteristics of auxiliary equipment used with fluorescent lamps, and contains apparatus for microscopical examination.

It is obvious from our examination that this project is an excellent example of careful planning, foresight and attention to detail. Plenty of room has been left for future possible development, and the equipment installed is primarily "working" equipment, much of it designed and built by Benjamin Electric to their own requirements.

This view shows the spaciousness of the main illumination laboratory

overseas news

Winnipeg Purchase

Details of proposals under which the Manitoba Government would purchase the electrical assets of the Winnipeg Electric Co., Ltd., have been revealed in Winnipeg. For the 564,989 Common shares of the company, representing the hydro-electric assets, the Manitoba Hydro-Electric Board has offered $36·50 per share, making a total of approximately $20,200,000. In addition, the Board hopes to take over the bonded indebtedness of the entire company about $27,400,000 — and some $5,000,000 worth of preferred stock, it is reported. This would bring the total cost of the power assets to just over $53,000,000. The offer is contingent on the formation of three corporations —transport, gas and a holding company which will acquire the head office building and certain other assets. Last year an accountancy firm valued the electricity undertaking at $54,900,000. President of the Winnipeg Electric Co., Mr. W. H. Carter, has recommended acceptance of the offer.

New Works

The new $2½ million plant of Brown Boveri (Canada) Ltd. at St. John's, Quebec, was officially opened last month. Production is already under way. The plant has an area of 55,000 sq ft for manufacturing operations. Initial output consists of switchboards, airblast circuit-breakers and power distribution transformers.

Bulk Supply

The Trinidad and Tobago Electricity Commission has just completed an agreement with Trinidad Cement Ltd., to supply the latter's new cement factory which is now under construction at Claxton Bay, Trinidad. Mr. K. W. Finch, general manager of the Commission, tells us that the demand of this factory during off-peak hours will be about 2,400 kW, and this will be reduced during the peak period to approximately 700 kW. The factory is expected to be in production in 1954.

Orders from S. Africa

A few months ago the Electricity Supply Commission of South Africa intimated to the Cape Town City Council that it would not renew the "pooling" agreement on its expiration in 1957, but that the Commission would be prepared to provide a bulk supply. The City Council decided to accept this offer and made the suggestion that the Commission should forthwith increase its generating plant capacity at the Salt River No. 2 station by installing the third and fourth turbo-alternator sets and condensing plant together with Nos. 5 and 6 boiler units in time for the winter of 1957. It was further suggested that to save time the Commission should negotiate prices with the contractors for the plant now on order for the first stage of the station. This has been done and the City Council has now been informed that tenders have been accepted for the plant required. The turbo-alternator sets to be installed will be supplied by Metropolitan-Vickers Electrical Export Co., Ltd. (£651,060—including a provisional sum of £8,000), the two sets of condensing plant by Vickers-Armstrongs, Ltd. (£157,500—including provisional sum of £3,000), and the boiler units by Babcock and Wilcox, Ltd. (£954,737—including provisional sum of £30,000). In addition two 36,000 kVA transformers for Nos. 3 and 4 generators will be supplied by English Electric Co., Ltd. (£57,433—including provisional sum of £5,000).

Tenders which have recently been accepted for the first stage of the Salt River No. 2 power station are: 33 kV switchgear, A. Reyrolle and Co., Ltd. (£365,551); water-softening plant, Permutit Co., Ltd. (£2,490); circulating water screening plant, F. W. Brackett and Co., Ltd. (£17,985); 33 kV transformers, English Electric Co., Ltd. (£72,685); auxiliary transformers and 33 kV reactors, Yorkshire Electric Transformer Co., Ltd. (£49,974); 3,300 and 380 V switchgear, English Electric Co., Ltd. (£165,278).

Aswan Dam to Proceed

The Egyptian Cabinet has now decided that work should commence immediately on the hydro-electric section of the Aswan Dam scheme. The Cabinet also decided to endorse a second project which would allow the water to pass through canals or tunnels to avoid dangerous vibrations on the dam. In May last, the Council of Ministers approved a decree law increasing the credit allocated to the scheme from £E24·6 millions to £E27·5 millions. The main power plant for the hydro-electric station was ordered a long time ago, and some parts are now arriving in Egypt, we understand. Mr. Geoffrey Kennedy, partner in the firm of Kennedy and Donkin, the consulting engineers, only recently returned from a visit to Egypt in connection with the scheme.

India's Revised Plan

A total expenditure of Rs 546·46 crores will be incurred by India on the development of irrigation and power under the revised draft five-year plan against Rs 450 crores originally proposed to be spent on them. While an additional sum of Rs 50 crores has been provided for Bhakra-Nangal, Damodar Valley and Hirkud projects the revised plan has allocated a

sum of Rs 40 crores for five other major irrigation and power projects apart from a separate provision of Rs 40 crores earmarked for minor and medium irrigation works. The five major irrigation and power projects in the revised plan are the first phase of the projects of Kosi (Bihar and Nepal) Koya (Bombay) and Chambal (Madhya Bharat and Rajasthan) and those of the river Krishna (Madras) and (Hyderabad) and Rihand (Uttar Pradesh). After completion and full development of all projects in the plan an additional area of 16·7 million acres will be irrigated while additional power available is estimated at 1·4 million kW. Although the total cost of five new projects included in the revised plan will be in the neighbourhood of Rs 200 crores the Planning Commission has stated that it might be possible to spend only Rs 40 crores on them during the period of the plan. Extension of electricity undertakings in private sectors during the period of the plan is expected to increase the total power generated by 176,000 kW mostly by the Tata power installations and the Ahmedabad and Calcutta electric supply corporations. It is understood that the Commission has also suggested that a comprehensive long-range plan for intereonnecting the existing and new hydro-electric and thermal stations should be worked out for the entire country in order to bring about planned development.

Meeting the Demand

An increase of 10,400 in the number of consumers connected since the Kanpur Electric Supply Administration took over the workings of the undertaking five years ago, is shown in the Administration's annual report. At the end of March 31 last, 24,400 consumers were being supplied, the connected load amounting to 93,850 kW. The number of units generated rose from 144 million in 1947 to 191 million during the twelve months ended March 31 last. This increased production, according to the report, "has been obtained without incurring any additional expenditure over that normally incurred on repairs and maintenance." Obviously the undertaking is fortunate to have a good margin of generating capacity to meet future demands, and for this its previous owners deserve credit. It is expected that next year will see the commissioning of a 15 MW extension which was decided upon by the Administration when it took over in September, 1947.

Council To Sell Appliances

The Brisbane City Council intends to establish an electrical appliance trading department, the Lord Mayor, Alderman Roberts, told the Council a few days ago. It is proposed to use the shop now occupied by Australian General Electric Pty. Ltd. in Kelvin House, Adelaide Street, he said. The Council adopted the recommendation of the Finance Committee to give the existing tenants of Kelvin House and Orient House six months' notice.

Too Old?

An amendment to the Electricity Trust of South Australia Act Amendment Bill by the leader of the Opposition, Mr. O'Halloran, which will prevent the appointment for the first time to the Electricity Trust of men of more than 65, was agreed to in the Assembly recently. The Premier, Mr. Playford, supported the amendment. Continuing the second reading debate, Mr. O'Halloran said he supported the other main provision of the Bill—to permit the Trust to issue inscribed stock—as being important for the safety of investors.

A Merchant's View

Comment on the recent proposal of the State Electricity Commissions of Victoria to defer payment on some contracts, was made by Mr. E. C. Etteridge, chairman of the merchants' section of the Electrical and Radio Federation of Australia, at a meeting of the Federation last month. He declared that the Commission had been subjected to unnecessary political interference. Over recent years the Commission has been compelled to observe political direction, in many instances contrary to its recommendations, he stated, maintaining that it was impossible for private industry to finance the Commission in the manner suggested by the Commission.

Maraetai's First Run

The Maraetai hydro-electric scheme, New Zealand, passed one of its biggest tests a few days ago when, with only half a head of water behind the dam, some 10,000 kW was generated by the first set. After testing the penstock tunnel leading to the generator used and making checks of the generator and turbine, engineers of the Ministry of Works and the State Hydro-Electric Department expressed satisfaction with the performance. It was stated that the tests proved conclusively that power would be available from the three machines with Maraetai Lake half full.

Taiwan Power Development

The Tien Lun power plant on the Tachia River at Taichun was recently formally inaugurated in Central Taiwan, Formosa, when the first of its three 26,500 kW generators was put into operation. With the addition of the new generator, the total electric power supply in Taiwan is now 330,000 kW, ten times more than in 1945 and about 80,000 kW more than the peak during the Japanese occupation. Much of the equipment and supplies has been purchased from abroad with U.S. aid funds. The second generator is expected to be ready by next spring. The construction of this new plant is part of a five-year expansion plan launched by the Taiwan Power Co. in connection with Taiwan's industrialisation programme. The five-year plan aims at providing an increase of 300,750 kW, all from water power except for 86,000 kW which will be produced by steam plant.

PERSONALITIES

IN THE INDUSTRY

Partner in the firm of Kennedy and Donkin since 1934, **Mr. Bryan Donkin,** B.A., M.I.E.E., has been elected chairman of the general council of the Engineers' Guild. He was actively associated with the design and construction of much of the original C.E.B. 132 kV grid system. Latterly, for the B.E.A., he has been concerned with the further extensions of the system, including the 275 kV grid, and the design of industrial power stations, especially those involving the combined production of process steam and electricity. The new vice-chairman of the general council of the Guild is **Mr. T. M. Megaw,** M.Sc., M.Inst.C.E., who has been resident engineer at the new Bankside power station. On the Executive Committee the new chairman is **Mr. W. A. M. Allan,** A.C.G.I., M.Inst.C.E., M.I.San.E., M.I.S.P., who is in charge of the Main Drainage Division of the Chief Engineer's Department of the London County Council, while the vice-chairman is **Mr. C. L. Champion,** B.Sc., A.C.G.I., A.M.Inst.C.E., M.I.Mech.E., A.M.I.E.E., who has been with the Ministry of Works since 1946.

Mr. Bryan Donkin

Senior executive changes are announced by the board of directors of Bepco Canada Ltd. These follow upon the recent visit to the Canadian company by representatives from each of the four British constituent companies. With effect from March 31 next **Mr. C. G. Abbey** (Montreal), who has been president and general manager since 1933, will assume the newly created position of chairman of the board. He will be succeeded as president and general manager by **Mr. Brian M. Burt** (Montreal), who has been associated with Mr. Abbey as vice-president and chief engineer since the establishment of the company. In addition **Mr. F. E. Regan** (Toronto), the Ontario branch manager, will become vice-president. Although relinquishing many administrational responsibilities, Mr. Abbey will be active within the company on matters of policy and operation. He has been associated with Lancashire Dynamo and Crypto Ltd. throughout his working years. After moving through various stages of the business in the U.K. he was sent to Canada in 1926 as president and general manager of the Canadian subsidiary. In 1933 he was active in the amalgamation of Bruce Peebles, Crompton Parkinson, Harland Engineering and Lancashire Dynamo, which formed Bepco Canada Ltd. Mr. Burt went to Canada in 1930 as director and general manager of Harland Engineering Co. of Canada, and since the formation of Bepco in 1933 has worked alongside Mr. Abbey. He served an apprenticeship with British Westinghouse, and after graduating at Manchester University joined Ferguson Pailin Ltd. before going to Harland Engineering in 1926 as managing engineer. Mr. Regan's career, like that of Mr. Abbey's, has been associated solely with Lancashire Dynamo and Crypto, and Bepco. From the Trafford Park works he went out to Canada in 1927 as sales engineer for Lancashire Dynamo. He became assistant manager of the firm's Toronto office in 1932, and after the formation of Bepco was appointed Ontario branch manager, a position he has held to the present time. In 1950 he was added to the board of directors.

Mr. C. G. Abbey

Mr. B. M. Burt

Mr. F. E. Regan

Retiring after 51 years' service, **Mr. A. F. Pearce,** general assistant engineer in the Brighton meter department of the South Eastern Electricity Board, was last week presented with a standard lamp and a cheque by **Mr. A. M. Harker,** district manager, on behalf of friends and colleagues.

Mr. I. A. R. Stedeford, chairman of Tube Investments, Ltd., has resigned his membership of the Advisory Council for Scientific and Industrial Research because of pressure of other duties.

Previously at Littlebrook power station, South Eastern Division, B.E.A., **Mr. F. Holt** is now deputy station superintendent at Agecroft h.p. generating station. He had earlier gained experience with the Kent Electric Power Co., Barking power station, County of London Electric Supply Co., and the undertakings of the Croydon and Halifax corporations. Another appointment at the Agecroft h.p. power station is that of **Mr. F. S. Kelly,** A.M.C.T., A.M.I.E.E., as electrical maintenance

engineer. A native of Manchester, he was previously a member of the technical staff in the instrument and meter department of the Metropolitan-Vickers Electrical Co. at Trafford Park.

The export manager of Lancashire Dynamo and Crypto Ltd., **Mr. A. J. C. MacLeod,** A.M.I.E.E., will be leaving London Airport on November 17 by Comet service for an extensive business tour of Pakistan, India, Ceylon and Cyprus on behalf of the Lancashire Dynamo group of companies.

Metropolitan-Vickers Electrical Co. Ltd. announces that **Mr. W. A. Coates,** M.I.E.E., F.Amer.I.E.E., has been appointed general sales manager, and **Mr. F. Gurney,** M.I.E.E., is now manager, home sales. Mr. Coates who succeeds the late Mr. Duncan MacArthur, retains his seat on the Board. Mr. Coates, has had a distinguished career in electrical engineering and is a well-known authority on switchgear. He joined Metropolitan-Vickers (then the British Westinghouse Company) at Trafford Park in 1909 and, except for a period as chief engineer of the Ferranti Electrical Co. of Canada, has been with the company ever since. In 1919, after some years on export work in Russia, France and Italy, Mr. Coates became chief engineer, Switchgear Department, but in 1922 he again went overseas, returning in 1927 to specialised work in the Switchgear Department, where he was successively consulting engineer, supervising the company's work for the C.E.B. during the initial stages of the British Grid, and sales manager. He became manager, home sales, in 1946 and a director in 1948. He is also a director of Metropolitan-Vickers/Beyer, Peacock Ltd., and Sunvic Controls Ltd. Mr. Gurney was educated at Keighley Grammar School and received his engineering training with the Yorkshire Electric Power Co. He joined Metropolitan-Vickers in 1919 and after a period in Motor Sales Department he went to the Manchester district office. Subsequent district office appointments, as manager, were Stoke-on-Trent in 1929 and Leeds in 1933. In 1941 he returned to Trafford Park to become sales manager of the Transformer Department, and four years later, sales manager of the Plant Department; in 1949 he was appointed assistant manager, home sales. Mr. Gurney was Chairman of the North Midland Centre of the I.E.E. in 1941-2.

Mr. W. A. Coates

Mr. F. Gurney

Mr. L. Atherton

Mr. A. E. Crawford

Mr. L. Atherton, B.SC., A.M.I.E.E., has recently joined the Equipment Division of Mullard, Ltd., to take charge of the Special Products Commercial Group. This group specialises in ultrasonic equipment and laboratory and industrial applications of electronic techniques. Previously, Mr. Atherton was at the Ministry of Supply Atomic Energy Factory, Springfield, Preston, as head of the group concerned with the measurement and control of hazards associated with the handling of radio-active materials. Mullard, Ltd., also announce that **Mr. A. E. Crawford,** A.R.Ae.S., of the Equipment Division, is now in charge of a special assignment to investigate applications of ultrasonic and other electronic equipment. He is undertaking this work at one of the Wandsworth factories of the company.

Seven awards have just been made by the president of the Council of the Royal Society. Among these we note that the Copley Medal has been awarded to **Prof. P. A. M. Dirac,** F.R.S., for his remarkable contributions to relativistic dynamics of a particle in quantum mechanics; the Hughes Medal to **Prof. P. I. Dee,** C.B.E., F.R.S., for his distinguished studies on the disintegration of atomic nuclei, particularly those using the Wilson cloud chamber technique; and the Sylvester Medal to **Prof. A. S. Besicovitch,** F.R.S., for his outstanding work on almost-periodic functions, the theory of measure and integration and many other topics of theory of functions.

Station superintendent at Chamber Hall power station, Bury, in the North Western Division of the B.E.A., **Mr. J. Stephen** is to retire on superannuation some time in January, we learn. He has been at Bury since 1913, having earlier spent four years with the Wigan undertaking, and has been station superintendent for over 22 years.

Retiring after 43 years' service with Walthamstow Council, **Mr. H. F. Moore,** public lighting assistant, was recently presented with a testimonial by the Council.

To mark the completion of 25 years' service with the Mullard Co. **Mr. H. L. Bowen,** a technical executive of the Valve Division, was recently presented with an inscribed gold watch and a cheque by **Mr. T. E. Goldup,** a director.

Generation engineer (operation), No. 2 Sub-Division of the North Western Division, B.E.A., **Mr. P. Ridings,** M.I.Mech.E., retired recently after 44 years' service with the electricity supply industry. He started with the Middleton Corporation Electricity Department, and in 1918 transferred to the Lancashire Electric Power Co., being appointed resident engineer at Kearsley power station in August, 1929. In the capacity of generation engineer (O), No. 2 Sub-Division, a position which he has held since March 1948, Mr. Ridings has been responsible for 15 stations, including the new high-pressure stations at Agecroft and Westwood (Wigan). At a formal ceremony he was presented with a gold wristlet watch and presentation book on behalf of his colleagues by the Divisional Controller, **Mr. A. R. Cooper.**

Mr. Percy Ridings

The B.B.C. announces the appointment of **Mr. J. W. M. Swanson** as engineer-in-charge at Newcastle-upon-Tyne. Mr. Swanson joined the staff of the B.B.C. in 1934 as an assistant maintenance engineer at the North Regional transmitting station at Moorside Edge. He later served as a maintenance engineer at the Newcastle studios and at the Tatsfield receiving station. In 1943 he became assistant engineer-in-charge at the B.B.C.'s monitoring station at Caversham and held that post until his present appointment.

The Plessey Co., Ltd., have appointed **Mr. J. L. Furner** as sales manager of their Telecommunications Division. He succeeds **Air Commodore T. P. Fagan,** whose new appointment entails liaison with foreign governments and Government departments on behalf of the company. Mr. Furner was for 26 years with Mullard, Ltd., during the last three of which he was in the Communications and Industrial Valve Division.

Recently appointed commercial assistant to the area manager in the Skye and Lochalsh area of the North of Scotland Hydro-Electric Board, **Mr. A. A. Wilson** has now taken up his new duties. For the last few years he has been on the commercial and development staff in the Board's Edinburgh office.

Manager of the Hebden Bridge district for the Yorkshire Electricity Board, **Councillor H. H. Sutcliffe** has been appointed by the Board as manager of the Todmorden area in addition. From 1918 until the industry was nationalised, Councillor Sutcliffe was manager of the Electricity Department of the Hebden Bridge and the Hebden Royd Councils. At vesting day he became manager for the Board in the Hebden Bridge district, with which undertaking he has served for 45 years.

W. T. Henley's Telegraph Works Co., Ltd., announce that **Sir John Dalton,** A.M.I.E.E., F.C.I.S., Barrister-at-law, is to join the board of the company. At the last annual general meeting of the company **Sir Montague Hughman,** companion I.E.E., M.I.E.(Ind.), announced his intention to retire and it is understood that Sir John will succeed him as chairman of the principal and subsidiary companies. The Cable Makers' Association has agreed to release Sir John from his position as director of the association (which he has held since 1948) as soon as his present commitments permit, which is expected to be the end of March next.

Sir John Dalton

Post Office headquarters, Scotland, announce that **Mr. F. R. B. Bucknall,** A.M.I.E.E., telephone manager of the Scotland west area since August 1951, is to succeed **Mr. M. W. Ramsay,** B.Sc. (Eng.), A.M.I.E.E., as manager of the Edinburgh area. Mr. Bucknall entered the Post Office Engineering Department in 1926 as an inspector, and after almost ten years' service in the Newcastle area was transferred to the Chief Regional Engineer's office in Edinburgh as chief inspector. He was promoted to assistant engineer in 1937 and power engineer in 1942. He first went to Glasgow in 1948.

Mr. Frederick Westall, a director and general manager of Burco, Ltd., has resigned his directorship. Mr. Westall, who joined the board in 1950, became chief engineer of the company in 1947 and general manager two years later.

Chosen as station superintendent at the new Carrington generating station, North Western Division, B.E.A., is **Mr. J. R. Appleton,** M.Sc.(Tech.), A.M.I.E.E., A.M.I.Mech.E., who has been senior assistant engineer (mechanical) in the Division's No. 3 Sub-Division since March, 1948. Mr. Appleton commenced his service in the industry in 1934 as junior assistant at Stuart Street power station, Manchester, and by August 1947 had become assistant resident engineer there. Educated at Crank Elementary School and Upholland Grammar School, he continued his studies at St. Helens Municipal Technical College and Manchester College of Technology. He takes up his new duties on December 1.

Mr. J. R. Appleton

Mr. Maurice Gorham, who was B.B.C. television controller for two years till resigning in 1947, has been appointed director of Radio Eireann, in Dublin. This service is being removed from direct Government control, and is to become a semi-independent organisation after the style of the B.B.C. It is also announced that **Mr. C. Brennan,** managing director of Brennan Industries Ltd., has been appointed chairman of the new Council set up by the Minister for Posts and Telegraphs to advise on the administration of Radio Eireann.

His friends will be glad to hear that **Mr. F. H. Schroeder,** A.M.I.E.E., a director of Lancashire Dynamo Holdings, Ltd., and sales director of Lancashire Dynamo and Crypto, Ltd., is making a speedy recovery after undergoing an operation in the Royal Northern Hospital in London recently.

OBITUARY

Mr. E. R. Keightley, who had been with Gent and Co., Ltd., since 1925, died on October 24, aged 43. He joined the company at the head office in Leicester and was transferred to the London branch in 1932. He had been the company's representative for general industrial sales in London and the South of England, in which capacity he was extremely successful.

Mr. E. R. Keightley

Mr. J. C. Farebrother, a director of Avon Electrical Services, Ltd., Stafford, died recently, aged 49.

Mr. H. S. Levick, chairman of Swift, Levick and Co., Ltd., died on November 4, aged 73.

Mr. H. M. Thompson, deputy station superintendent at Thorpe generating station, Norwich, died on October 31, aged 57. Mr. Thompson spent the whole of his career with the Norwich undertaking. After serving in various departments he was appointed charge engineer at the old Duke Street station, and when the Thorpe generating station was commissioned he was transferred there as shift charge engineer. In 1936 he became boiler house superintendent and in 1940 he succeeded Mr. D. H. Brown as deputy station superintendent on Mr. Brown's appointment as station superintendent.

Mr. S. T. Buer, M.I.E.E., a member of the headquarters staff of the technical director of Standard Telephones and Cables, Ltd., died on October 29, aged 63. He joined the company (then Western Electric Co.) in 1912 after service with the National Telephone Co., and from 1933 to 1948 he was chief transmission engineer at Standard's North Woolwich Location.

Mr. Martin Andrews, senior control engineer to the Electricity Board for Northern Ireland, died on November 5, aged 51. He joined the Board in April, 1935, from Kennedy and Donkin.

Mr. Malcolm Clark, vice-chairman of Richardsons, Westgarth and Co., Ltd., died on November 1, aged 59.

Mr. A. P. Wood, who died on November 7, aged 80, was well known as one of the founders of the Lancashire Dynamo and Motor Co. (now the Lancashire Dynamo and Crypto Co. Ltd.), and had been managing director of that concern almost from its inception at the end of the last century till 1933. In that year he joined the board of Laurence Scott and Electromotors Ltd. as sales director, but retired in June, 1934.

NEW LITERATURE

The Resonant Cavity Magnetron

by R. S. H. Boulding, O.B.E., B.SC., M.I.E.E., A.M.I.Mech.E.

WHENEVER some new technique becomes established and in general use, a need arises for an instructional book that can serve those who have to operate equipment incorporating the new departure. A full technical study is usually not required for such operators; rather an uncomplicated description that will enable them to appreciate the basic principles involved. The present handy volume is an excellent example of this kind, and should prove of considerable value to those with a general electrical training who wish to learn about magnetrons. The basic ideas involved are discussed clearly in the first section, and this is followed by a consideration of practical difficulties and the methods devised to overcome them. Finally come notes on the construction of practical magnetrons, and on the associated waveguides, transmission lines, etc. The whole volume reads very easily, and although there is resort to mathematical analysis on several occasions, this is always backed up by an equivalent physical explanation. Published by Newnes, 147 pages, 8½ in. by 5½ in. Price 21s.

BOOKS RECEIVED

Half-Sized Heat-Entropy Chart for Steam. In our brief note on this new publication last week, we incorrectly stated that it is modelled on a B.E.A.M.A. publication. In fact, of course, it is the E.R.A. diagram from which it is derived.

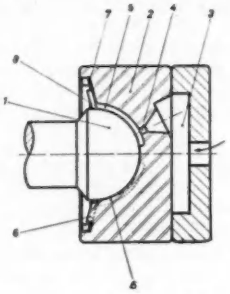
The Collapse Method of Design, prepared by a committee of the British Constructional Steelwork Association in collaboration with the British Welding Research Association. This booklet applies the plastic theory to the design of mild steel beams and rigid frames in considerable detail. Publication No. 5, B.C.S.A., Artillery House, Westminster, S.W.1, 52 pages, 11 in. by 8½ in. Gratis.

Running on Air

DETAILS of developments in air bearings for small rotating machines were published recently by Miniature Bearings, Ltd., British distributors for the Swiss RMB firm. In these bearings, which are suitable, for instance, for high-speed gyroscope rotors, the bearing is supported by compressed air. The diagram shows some details of the construction.

The rotor shaft terminates in a spherical pivot 1, the diameter of which is a function of air pressure and rotor weight. Compressed air is led into a circular chamber 3, where it passes through nozzles 4 into a pressure chamber 5. Partitions 6 separate the chamber into a number of segments, and these are closed by an elastic membrane 7 having a tongue 8. These tongues, mounted on extensions of the partitions, act as valves. Their extremities assume the circular shape of the pivot, and their distance from it varies from 0·01 to 0·08 mm according to the air pressure.

If the pivot is by some force displaced from its central position, the opening presented by the tongues changes, altering the pressure effect and re-centring the pivot. The reaction is stated to be instantaneous, the displacement of the pivot remaining of the order one micron.



Details of air bearing construction

Axial play is of the order of 0·01 mm in an artificial horizon gyrostat, while radial play may vary from 0·01 to 0·04 mm. In cases where shafts are heavily loaded, compressed air may be replaced by a low-viscosity liquid such as paraffin. The mean friction of the air bearing, which is not yet commercially available, has been shown by tests to be between $2{\cdot}3 \times 10^{-6}$ and $1{\cdot}4 \times 10^{-6}$.

WORLD SUPPLY STATISTICS

STATISTICS of electricity generation throughout the world for the years 1948-50 are included in the latest issue—No. 6—of the Statistical Year Book of the World Power Conference.* In addition, the year book covers coal, brown coal and lignite, peat, coke, manufactured fuel, wood, gas and water power. In most cases, the statistics used have been specially supplied to the conference officials on standard forms and with standard definitions. An exception is the case of figures for electricity, which are in general taken from Unipede lists.

Electricity

Though the extensive tables in the year book give 1950 production figures of many countries, an overall estimate of world output is not possible for later than 1949. For this year, reported total production is 726×10^9 kWh, excluding the whole Soviet world (U.S.S.R. and China). With certain simplifying assumptions, the 1950 equivalent is reckoned to be 815×10^9 kWh, with 1948 having stood at 695×10^9 kWh.

An addition to the statistics of many countries, which should prove specially valuable, relates to production in industrial establishments. Production figures, in general, are supplemented by estimates of consumption.

WORLD PRODUCTION OF ELECTRICITY, 1949

Division	Total reported production	Production Distinguished as Fuel or Hydro				
		Total so distinguished	Fuel operated plants		Hydro electric plants	
	10^9kWh	10^9kWh	10^9kWh	%	10^9kWh	%
Africa ...	12·9	*a*	*a*	*a*	*a*	*a*
North America	401·8	390·0	252·2	65	137·8	35
South America	13·1	*a*	*a*	*a*	*a*	*a*
Asia ...	50·8	48·1	9·7	20	38·4	80
"Western Europe" *d*	216·6	216·6	126·8	59	89·8	41
Oceania	11·0	10·9	6·7	61	4·2	39
"Western World"	706·2	666·8 *b*	396·2 *b*	59*b*	270·6	41
"Other Europe" *e*	20 *E*	*a*	*a*	*a*	*a*	*a*
Totals ..	726	675·1 *c*	403·5 *c*	60*c*	271·6 *c*	40*c*

(*a*) Reported statistics not sufficiently comprehensive to justify subdivision; (*b*) total including reported statistics for Africa and South America; (*c*) as for (*b*), plus estimates for Czechoslovakia; (*d*) Europe other than Bulgaria, Czechoslovakia, E. Germany, Hungary, Poland and Rumania; (*e*) countries excepted in (*d*); (*E*) estimated.

* Edited by F. Brown, B.Sc.(Econ.), F.S.S. Published by the Central Office, World Power Conference, 201 Grand Buildings, Trafalgar Square, London W.C.2., 163 pages, 11 in. by 8¼ in. Price 35s., postage 9d.

Hot Water in the Home

Housewives find Electric Methods of Heating Most Satisfactory

A REMARKABLE tribute to the convenience of electrical methods of water heating is paid in a newly published D.S.I.R. report.* In a survey carried out during the August and early September of 1948, and now analysed, 92% of the housewives possessing "electric coppers" considered them satisfactory for water heaters, while 88% felt the same about immersion heaters, and 86% on storage heaters. These figures, which are shown in the table, compare well with all other types of appliance, and support those published earlier for experience in the winter.

In cases where dissatisfaction with electrical appliances was expressed, the usual reason was, "not enough hot water at a time" or "takes too long to get hot."

Frequency of Use

Satisfaction, however, was only one of several factors which were taken into account in the survey. There was attention, for example, to the frequency of use of heaters. It was found that as many electric storage heaters were used each day in summer as in winter, but that they were used fewer times in the summer. On the other hand, twice as many electric immersion heaters were used daily in summer as in winter. There was no marked variation in the total number of appliances used for heating bath water in either season.

As between individual houses, a great variation was found in the amount of hot water used. The range in the survey was from less than 50 gallons to over 1,000 gallons/week on a basis of 140° F. The average temperature of "hot" water was found to be 120° F. in both summer and winter. For "warm" water the temperature was 105° F, and this was identical with the average temperature of water used for bathing. For dish washing the average temperature was 118° F, whereas 180° F has been suggested as necessary for effective sterilisation.

Standardised for a family of two adults and two children, one an infant, the weekly consumption for households possessing a solid fuel appliance with an immersion heater is estimated at 293 gallons/week, as against 84 gallons where no appliance is available.

Immersion heaters were found to be distributed in connection with solid-fuel appliances in the proportion 88% with inset fires and 12% with independent boilers. Hot water tanks were lagged in 72% of cases and pipes in 13%; the proportion of tanks lagged is three times as many as in the national survey. Housewives in general indicated that in winter the immersion heater was often used for "topping up" the solid-fuel appliance.

HOUSEWIVES' EXPERIENCE WITH WATER HEATING APPLIANCES

Type of Appliance	% Satisfactory for Water Heating	
	Winter	Summer
STORAGE HEATERS		
Solid Fuel		
Inset fire ...	67	76
Fire with oven	72	73
Independent boiler... ...	75	81
Gas		
Storage ...	72	64
Electric		
Storage ...	71	86
Immersion ...	89	88
INSTANTANEOUS		
Gas		
Single point ...	59	80
Multi-point ...	53	68
COPPERS		
Solid fuel ...	55	73
Gas	77	90
Electric ...	81	92
HOT WATER LAID ON	77	91

Home Laundering

One of the most interesting results of the survey relates to laundering at home. It was found that one in five households in urban areas, and one in three households in Scotland and also in the London Region, would do more washing at home if there were an improvement in their methods of obtaining hot water. As the Report comments, "it does not follow that the regular use of a laundry would diminish in consequence . . . it might be that improved standards of personal and household cleanliness would result."

* An Inquiry into Domestic Hot Water Supply in Great Britain: Part II, The Use of Water Heating Appliances in Summer, and The Relation Between the Usage of Hot Water and the Appliances Available. Published by H.M.S.O. as National Building Studies Special Report No. 14, price 3s.

The BUYER'S *Column*

Holophane "Lumilux" Units

AN entirely translucent all-glass unit embodying a glass canopy and based on the Holophane system of prisms has been developed by HOLOPHANE, LTD., Elverton Street, S.W.1, for use in schools, offices and similar commercial situations.

Holophane Lumilux fitting

The units, known as "Lumilux" have clean and modern lines, the patterns of the prisms being especially chosen to give a desirable degree of sparkle when the lamp is lit, while the whole has been designed to eliminate glare under all normal conditions.

A unique feature of the fitting is the combined glass canopy and reflector which forms one moulding and not only eliminates the normal separate canopy, but gives added strength to the unit. The diffusing cover glass is clipped to the reflector unit, and carries an interesting diffusing pattern of flutes and cross prisms. The reflector may be white or "Correctalite," while the cover glass is white only. Both glasses are normally velvet finished.

The principle of the support of the glass is also unique. A rectangular die-casting carrying the porcelain E.S. lampholder enters a rectangular aperture in the top of the glass and is turned to register across the aperture and is then locked in position by a top cover plate. Two soft pads attached to the die-casting prevent glass-to-metal contact on the load-bearing surfaces.

The units are available in white or "Correctalite" glass, for use with 150-watt or 200-watt filament lamps and are made for chain or tube suspension.

Jacksons' New 191J Cooker

REVISED prices of their 190 series "Cleanline" cooker, effective from October 27, have been announced by THE JACKSON ELECTRIC STOVE CO., LTD., 143 Sloane Street, S.W.1.

They also announce the introduction of a new model 191J, which is a development of the 190J model. Model 191J has a much larger oven capacity than the 190J and has 8-in. and 6¼-in. boiling plates on the hob, and a grill boiler. It is fitted with thermostatic oven control, and is offered as a leg model finished in grey splash or mottled green and cream vitreous enamel at its lowest list price of £27 6s.

This model, together with the 190J model which is listed from £24, provides the industry with two low priced cookers of the highest quality, suitable for housing estates and other contracts.

192J and 194J cookers are now offered as drawer models only with a standard finish of two-tone ivory from the following prices: With cold drawer: 192J, £31 7s. 6d.; 194J, £36 9s. 6d.; with heated drawer: 192J, £33 2s.; 194J, £38 4s.

The price of the 69 "Giant" cooker remains the same at £18 15s. without stand.

Improved Geiger Muller Tube

LONGER life, larger pulse amplitude and lower operating voltage are the outstanding characteristics of the new Geiger Muller tubes designed by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.

The new tubes have been manufactured on a pre-production scale and are obtainable at short notice. Similar in size and window height to the existing GM.4 tube and with an operating voltage of about 450 V, the 25B7H uses a bromine quenching agent and is known as a halogen quenched type.

Other types of halogen quenched GM tubes will be available later.

The latest 191J cooker by the Jackson Electric Stove Co. is suitable for housing estates and other projects

Pioneer Staff Locator System

MARKETED by COMMUNICATION SYSTEMS, LTD., Strowger Works, Liverpool 7, the pioneer staff locator system comprises a series of three-digit indicators which are automatically illuminated upon the operation of a motorised control unit to form codes. Forty codes are possible. If required, the system can be arranged to provide a short audible warning that a code is being transmitted.

The indicators are finished in permanent crackle gold with aluminium or chromium-plated

The "Pioneer" for wall mounting

fittings and the three digits 2, 4 and 6 in red perspex, illuminated internally by 14-watt sign lamps.

The motorised control unit is housed in a crackle black finished metal cabinet, suitable for desk use or mounting on a wall shelf. Each control unit is capable of operating 50 indicators of the three-lamp type, the maximum current drain being 10 amps.

New Spherical Speaker

A NEW speaker intended for use in the installation of efficient public address systems, has been designed by HADLEY SOUND EQUIPMENTS LTD., of Smethwick, Birmingham.

The speaker incorporates an 8-in. or 10-in. moving-coil unit mounted in a spherical aluminium alloy casting. As the case is made in two halves, it can be used either as a complete sphere, when it resembles a spherical light fitting, blending in with lighting and decorative schemes, or as a single hemisphere for flat mounting on wall or ceiling. By combining two of the slotted hemispheres it can be used as a duo-diffuser.

The H.S.E. speaker comprises two slotted hemispheres

Power handling capacity is up to 6 watts, and the speaker, being waterproof, is suitable for both indoor and outdoor use.

The list price of the complete spherical speaker finished in grey crackle stove enamel, incorporating a high flux 8-in. unit and multi-ratio matching transformer, is £10 10s.

Sectional Eeto Insulating Jacket

A NEW sectional insulating jacket which can be fitted in a matter of minutes to any type of domestic storage or immersion heated hot-water cylinder, is now being produced by EETO INSULATIONS, of River Street, Bolton, Lancs.

Each section of the jacket consists of a ¾ in. layer of fibreglass with a stout canvas backing and a glossy cream plastic exterior. The requisite number of these sections, each of which is 6 in. wide, is hooked on an extensible ring fitted round the water inlet pipe and bound tightly to the cylinder by flexible black lacquered steel bands.

The glossy finish of this Eeto jacket offers many advantages over the conventional type. Made from Lorival plastic material, it is non-inflammable, vermin-proof and hygienic. An occasional wipe down with a damp cloth is all the cleaning required to restore its neat attractive appearance.

Recent tests have shown that using the jacket leads to considerable reductions in heat losses.

Lorival Plastic is included in this EETO Jacket

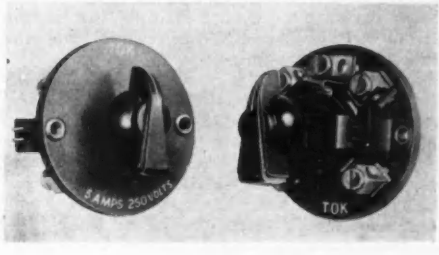
"TOK" 5-amp Rotary Switch

TO meet a demand for a 5-amp rotary switch of high electrical quality and compact construction, suitable for flush or box mounting, TOK ELECTRICAL AND INDUSTRIAL MECHANISMS, LTD., of 2 Wadsworth Road, Perivale, Greenford, Middlesex, have produced a range of slow-break four-position switches designated K.10.

These are rated at 5 amp and for voltages up to 250. Although primarily designed for a.c. circuits only, they can be used to a limited extent on d.c. circuits at reduced capacity.

The K.10 switches are available with over fifty different switching sequences including 4 circuit selective and double-pole change over with off, and are used in all sorts of apparatus where the power input does not exceed 1·25 kVA.

These Series K10 rotary switches have been added to the TOK range



The K.10 switches are made in two main types —K.B.10 for flush mounting in which the fixing is by means of two 4 B.A. screws inserted from the front of the panel, and K.S.10 which may be mounted in a box or similar recessed housing. Normally the K.10 switches are supplied with four operating positions and may be rotated in both directions. List price of both types, 9s. 6d.

Price Changes

PRICES of "Blaco" conduit screwed couplings which appeared in Catalogue No. 208, issued by the makers, F. C. BLACKWELL AND CO., LTD., Great Crosby Works, Liverpool 23, have now been revised as follows: $\frac{5}{8}$ in., 2s. 1d.; $\frac{3}{4}$ in., 3s. 9d.; 1 in., 4s. 10d.; $1\frac{1}{4}$ ins., 7s. 6d.; $1\frac{1}{2}$ ins., 10s. 4d. All prices quoted per dozen.

The CR181/F six-valve superhet car radio styled for installation in the latest design facias of the Ford Consul and Zephyr-Six models, announced by E. K. COLE LTD., Southend-on-Sea, Essex, is now priced at £33, tax paid (includes £9 19s. 7d. purchase tax).

THOR APPLIANCES LTD., 64 Oxford St., London W.1, announce a $12\frac{1}{2}\%$ reduction in the price of the Thor Automagic Spin Dry washing machines. New price is £97 10s. (inc. £32 10s. tax) compared with £111 11s. (inc. £38 16s. tax).

Ekco Coronation Lights

AVAILABLE from EKCO-ENSIGN ELECTRIC LTD., 45 Essex Street, Strand, W.C.2, are a red, white and blue fluorescent lamp in 5 ft 80 W, 4 ft 40 W and 2 ft 20 W sizes; small tungsten decoration lights, packed in display cartons of 13 lamps, three of each colour, with one spare for 200/250 V supplies, and a 5 W neon lamp with the electrodes in the form of the letters "E.R."

New Blaco Conduit Fittings

FURTHER additions to the range of conduit fittings made by F. C. BLACKWELL AND CO., LTD., Great Crosby Works, Liverpool 23, have been announced.

These included one- and two-gang (68/1 and 68/2) switch and socket boxes and back-to-back switch boxes (69/3).

The 69/2 two-gang switch box has corner cover fixing and was originally specified for prefabricated housing.

TRADE PUBLICATIONS

SWITCHES.—Four new Lundberg leaflets recently issued by Simplex Electric Co. Ltd., Broadwell, Oldbury, Birmingham, feature the "Speedy" d.p. switch, "Duplex" and intermediate switches d.p. changeover, and "Tripolit" triple-pole switches and series parallel, all or part and "off" and inductive circuit switches.

TRACTION.—Electrical equipment for trolley-buses, one of the facets of the production of General Electric Co. Ltd., Magnet House, Kingsway, W.C.2, is featured in a new G.E.C. brochure P.1853.

ALLOYS.—A guide to the selection of suitable casting alloys in aluminium, magnesium and zinc has been published under the heading "Birmal Data" by Birmingham Aluminium Casting (1903) Co. Ltd., Dartmouth Road, Smethwick, 40. The booklet has been produced with the idea of giving potential users of light alloy castings and zinc alloy pressure die castings essential particulars about these alloys in general use.

DECORATIVE LIGHTING.—Coronation illumination and floodlighting equipment is featured in a new brochure issued by Falk Stadelmann and Co. Ltd., 91 Farringdon Road, London E.C.1.

REFRIGERATION.—Leaflets issued by the Pressed Steel Co. Ltd., Cowley, Oxford, feature the LHVP 65/8 sub-stratosphere cabinet and the Prestcold Lollipop freezers.

FLUORESCENT LIGHTING.—The "Atlas" Fluorescent Lighting handbook has been revised and re-issued as a second edition by Thorn Electrical Industries, Ltd., 105 Judd St., London W.C.2

BATTERY CHARGERS.—Sentercel home battery chargers are made by Standard Telephones and Cables Ltd., Rectifier Division, Warwick Road, Boreham Wood, Herts. A recent sheet gives comp'ete details and specification of these units.

HEATING.—Two interesting handbooks issued by Allied Ironfounders Ltd., 28 Brook Street, London W.1, are intended for architects and planners. The first, entitled "Heat"—cooking, heating and hot water in low-cost houses—is for all concerned with the provision of low cost housing as recommended in the publication "Houses, 1952." Its aim is to suggest lines of approach to the problem of providing heat services for such homes. The companion volume of information sheets gives detailed descriptions of the appliances produced by the firm and its associates. It is, however, mainly concerned with solid fuel appliances.

LUBRICATION.—The way in which C. C. Wakefield and Co., Ltd., 46 Grosvenor St., London W.1, makers of "Castrol" and Wakefield Industrial Lubricants, are "Serving Industry" is shown in a new brochure issued by the firm.

WELDING AND HEATING. The first combined industrial catalogue issued by Philips Electrical Ltd., Century House, Shaftesbury Avenue, London W.C.2, has 32 pages, setting out the full range of Philips Products under section headings such as Arc Welding, Resistance Welding, High-frequency Heating, etc.

CABLE ACCESSORIES.—The complete range of weatherproof rubber cable couplers, now marketed by Nettle Accessories, Ltd., Harper Road, Wythenshaw, Manchester, is described in a new leaflet.

PLASTICS.—A booklet issued by British Industrial Plastics, Ltd., 245 Oxford Street, London W.1, describes the Dye test for checking the quality and condition of the cure in melamine moulding.

The WEEK in NEWS

U.K. Productivity Council Formed

Lord Citrine elected among 23 Members

THE new British Productivity Council was formally established last week with the election of its chairman and full complement of 23 members. The formation of this new body was envisaged some months ago, and it will be recalled that some details of future plans were contained in the final report of the Anglo-American Council on Productivity published early in September (see our September 11 issue). Broadly, this new organisation takes over from the U.K. section of the Anglo-American Council, though its scope of activity is to be widened.

The elected chairman is Sir Peter Bennett, past president of the F.B.I., and chairman and managing director of Joseph Lucas, Ltd. Under him will be four members nominated by the F.B.I., five nominated by the British Employers' Confederation, nine nominated by the T.U.C., one each nominated by the Association of British Chambers of Commerce and National Union of Manufacturers, and three representatives of the nationalised industries. Included among the last three is Lord Citrine. Sir Peter Bennett was one of the joint chairmen of the former U.K. Section of the Anglo-American Council on Productivity.

The Council will meet again shortly to consider in detail the extent and nature of its future programme.

GOVT. LEAD STOCKS

IT is anticipated that within the next few weeks there should be sufficient lead available from normal trade sources, and the Ministry of Materials is making arrangements for sale to producers of most of its remaining commercial stocks. Pricing is to be on the basis of the monthly average London Metal Exchange quotation over 14 months. This will leave a residue of about 9,000 tons, which will be used to satisfy consumers' needs which cannot be supplied from normal trade sources. The balance will be disposed of gradually over the next few months as opportunities arise.

New Malayan Agents

THE London Electric Wire Co. and Smiths Ltd., and their associated companies, Frederick Smith and Co., the Liverpool Electric Cable Co. Ltd., and Vactite Wire Co. Ltd., have appointed Mitchell Cotts and Co. (Far East) Ltd., as sole selling agents for Malaya, Singapore, Siam, Sarawak and British North Borneo. The chief office of Mitchell Cotts and Co. (Far East) Ltd., is at Lee Rubber Buildings, High Street, P.O. Box 40, Kuala Lumpur, Malaya.

BOARD ALTERS ITS TARIFF ASSESSMENT

THE two-room minimum method of assessment under the standard domestic tariff is to be abolished by the South East Scotland Electricity Board. Formerly, domestic consumers in one room in most of the area had to consume 120 units at 4½d. per unit (3½d. in Edinburgh) before they qualified for the cheaper unit rate. In announcing this decision, the Board has stipulated what is a one-roomed house for the purpose of the assessment. Kitchens and kitchenettes of less than 150 sq ft were formerly not counted as rooms, but now they will be if they are not used exclusively for culinary purposes and if they have an open fireplace.

Meter Reading Talks

IT is understood that talks have been arranged to discuss the possibilities of joint meter-reading schemes. Participants in the discussions will be the B.E.A., the Gas Council and trade unions. As reported last week, the B.E.A. has now sanctioned experiments in the Merseyside and N. Wales Area.

The First Half-Century

Between the National Electrical Contractors' Association and the National Electrical Manufacturers' Association no love is lost, but in the presence of a common enemy the two have decided to suspend their own particular feud for the moment. At a conference held recently the two associations agreed to take united action against those architects and consulting engineers who claim trade discounts, either for themselves or for their clients. The various Institutions and Institutes are to be asked to put a stop to the practice, which is stigmatised by the allies as a breach of professional etiquette. The architects, who by reason of the age and the traditions of their calling ought to be paragons of professional propriety, are understood to have an inordinate weakness for trade discounts. Discounts they may be from the seller's point of view, but when they change hands they often change natures and deserve rather to be described as commissions.—*From our issue of November* 13, 1902.

Cardiff protests against New Tariffs

FOLLOWING closely on the chairman of the S. Wales Electricity Consultative Council's request for further opinions on the new power charges before the matter was discussed at the Council's meetings, the Cardiff Corporation Parliamentary Committee have decided to forward a strong official protest. The town clerk has been instructed to draft formal representations for eventual submission to the Consultative Council. Copies will be sent to the Minister, the Gas Consumers Council and Cardiff's M.Ps.

It was stated that the Board anticipated an increased revenue of about 10%, but to many consumers the rate would rise by some 70-80%. The majority of people in Cardiff used gas for cooking, and unless one used electricity for cooking and water heating it would be impossible to avoid the bulk of consumption being charged at 5d. per unit. Those people with limited incomes and old age pensioners who were doing their best to economise in the use of electricity, would be charged 5d. a unit for lighting.

The Board was criticised as being answerable to no one and all-powerful. It was therefore the city council's duty to protect ratepayers, to protest to the Board and to seek a reconsideration of the tariff formula.

N. IRELAND WAGE CLAIM REJECTED

EMPLOYEES in the Northern Ireland Electricity Supply Industry, who had asked, through their Unions, for a wage increase of 3d. an hour, retrospective from August 1, have been told by the employers that any such increase would inevitably lead to further rises in tariffs, with consequential harmful effect on industrial and domestic consumers. A statement to this effect was issued at the meeting of the Joint Industrial Council in Belfast last Thursday. The Unions had contended that the claim was justified in the light of the rise in the cost of living and the increases conceded recently to manual workers in other industries. The Unions are reporting back to their members for advice and or instructions on the next step.

Information Sought for Belfast Enquiry

THE question of a Government enquiry into certain matters relating to the Belfast electricity undertaking was raised in the Stormont last week. Mr. M'Cleery, the Minister of Commerce, confirmed that the Government had been requested to hold such an enquiry. But the relevant resolution of the Council did not indicate any particular matters into which an enquiry was sought, and he had asked for further information to enable the Government to consider the matter further, he said.

Advice on Coronation

ADVICE on expenditure, decorations, souvenirs and designs in connection with the Coronation is contained in a Ministry of Housing circular despatched to local authorities last weekend. The Ministry of Works is to give all reasonable facilities to those wishing to floodlight monuments. Pageants and floodlighting is dealt with in the circular, which also states that the Queen wishes celebrations to be kept simple and expenditure as low as possible.

OFFICIAL PUBLICATIONS

E.R.A. Reports:—
C/T 105. *Extension of Momentum Theory of Wind Turbines*, H. H. Rosembrook, 6s. 3d.; L/T 251. *Dipolar Permittivity and Structure in Ketone-Paraffin Mixtures*, V. Daniel and K. H. Stark, 9s. 3d.; and L/T 278. *Electro Chemistry of Non-Aqueous Solutions*, I. G. Roe, 15s. 4d.

SCOTTISH HOUSING HANDBOOK, PART 2. *Roads and Services.* (*See page* 898.) H.M.S.O. 1s.

NORTH OF SCOTLAND H.-E. BOARD. (*Construction Scheme No.* 61.) *Kilmelfort project. Confirmation Order, S.I.* 1919, 2d., *and Explanatory Memorandum*, 3d. Both from H.M.S.O.

MIN. OF HOUSING AND LOCAL GOVT. CIRCULAR NO. 79/52. *Celebration of Coronation.* (*See this page.*) H.M.S.O. 3d.

DOMESTIC HOT WATER SUPPLY IN G.B. PART 2. (*See page* 891.) H.M.S.O. 3s.

£2 Wage Dispute has been Settled

AFTER many months of meetings, offers, counter-offers and rejections, the dispute over wage claims made by the Confederation of Shipbuilding and Engineering Unions has been settled. The original claim was for a £2 a week increase. The engineering trade union leaders have decided to accept the employers' offer of an increase of 7s. 4d. a week. Shipbuilding chiefs accepted the offer of 7s. 6d. a week. The confederation executive met on Friday after employers had refused to raise their offers. A motion that the offers be rejected and a ban on piecework and overtime imposed was turned down. Additional cost to industries will be about £50 million a year.

Radio Techniques in Steel Works

A RECENT demonstration of B.T.H. "Clearcall" communication equipment in the melting shop of a modern, large steelworks indicates that delays between crane "lifts" can be reduced to a minimum. In view of the considerable distances between ground and crane cab, other methods previously used are now replaced in this equipment by an electronic method based on "carrier" technique.

The crane controller uses a microphone associated with a control box adjacent to the furnace control panel. The microphone output is superimposed on a carrier wave of suitable frequency which is fed to the crane cab through its feeder conductors. At the cab the transmission is picked up off the collector arms and after demodulation, the information is relayed to the operator over a speaker and horn assembly. By this method clear, even reproduction is obtained over the whole length of crane travel.

DIMMER CONTROL AND U.V. LAMPS FOR BALLROOM LIGHTING

TWO references have been made in the past few weeks to the recently introduced ultra-violet fluorescent lamps and dimmer control units. Previous mentions have concerned demonstrations of the technique but we note that the system has been installed in a ballroom, appropriately enough at Newmarket's Carlton Hotel, where the Eastern Electricity Board held its annual cabaret ball. Responsible for the installation were Thorn Electrical Industries, Ltd., whose dimmer control system has been adopted in numerous theatres. It is believed to be the first application of the scheme to a ballroom.

During the evening the coloured fluorescent tubes were subjected to constant automatic variations, the hall being sprayed with blue, green, red and gold lighting intermittently. Feature of the evening was a humorous mural which stretched the length of the balcony, depicting a racing scene. This was painted with special fluorescent paint and illuminated by hidden ultra-violet fluorescent tubes. The mural was painted by Key-studios. Running cost of this installation has been estimated at about a penny an hour. Similar systems are available for hire.

Cooking Contest for Children

CATCH your customer young, appears to be the policy of the S.W. Scotland Electricity Board, which recently staged a cooking competition for children. The ten finalists (five boys and five girls) from an original entry of over 1,200, had to grill a kipper, make scones and prepare a cup of tea. Electric cookers and kettles were provided. The aim of the contest might well be described by the familiar phrase "Even a Child can do it," as the Board were eager to show how simple was the proper and efficient use of electrical equipment.

Simplicity was the keynote of the winning window in the S.W. Electricity Board's 1952 Display Competition, reported in these columns last week. Above is Torquay's window which won the Area Challenge Cup

Prince Philip honours City and Guilds

ADMIRATION for the work of the City and Guilds of London Institute was expressed by H.R.H. the Duke of Edinburgh last week when he presided at the yearly meeting of the Institute, of which he is president. Education for industry, he said, must necessarily cover a very wide field of subjects, with practical technicians no less important than scientists and technologists. The education and training of such men was one of the most important jobs being carried out by the Institute's Department of Technology. In this respect he specially welcomed the Institute's new Insignia Award (see ELECTRICAL TIMES, October 30), which set another goal for men with a predominantly practical background and training.

It was untrue that the traditional British craftsman no longer existed. In laboratories, workshops and engineering research and development departments, the standard of craftsmanship was as high as ever.

In his speech the chairman of the Institute, Sir Frederick Handley Page, spoke of expansion during a successful year, especially on the part of the Department of Technology, which controlled the examination of some 80,000 candidates every year. Finances were causing some anxiety in the face of this expansion, and help from industry was needed if opportunities were not to be lost.

Anglo-Canadian Talks on Atomic Energy

TECHNICAL policy as regards atomic energy was discussed at a conference between U.K. and Canadian representatives at Harwell last week. The agenda included a discussion of both immediate and long-term plans of both countries' programmes on the industrial application of atomic energy.

IMPORTS INTO FRANCE

DETAILS were made available last week of the French import quotas in respect of Gt. Britain and the Commonwealth, for the fourth quarter of 1952. They were announced following last month's Paris meeting of Franco-British Joint Committee and a full list of items covered has been published in the *Journal Officiel*. Numerous electrical and radio goods, particularly domestic equipment, are included in the list, notably washing machines, vacuum cleaners, radios and recording apparatus. Details of items to be imported into France from O.E.E.C. countries during the next six months have also been announced.

Electricity Mains and Scottish Housing

NOTES for technical officers concerned with the siting of services for housing schemes are given in a recently published Scottish Housing Handbook. Under the general advice of "consult with the Electricity Board," it is suggested that underground electricity mains should be near the heel of the footpath, at least 1 ft 6 in. below the surface. The possible use of overhead distribution schemes in the interests of economy is noted with the comment "by careful placing of poles and arrangement of cables, this can sometimes be done without too much harm to the appearance of a scheme." The right is reserved to local planning authorities to decide whether overhead cables should be allowed.

Details of the report, which also deals with the siting of substations and co-ordination with other services, is given in our "Official Publications" section. The report also gives a short note on street lighting.

New E.A.W. Branches

A NEW branch of E.A.W. was formed at Salisbury last week under the presidency of Lady Richmond. Speakers at the inaugural meeting included Dame Caroline Haslett. Chairman of the new branch is Mrs. Blyth. A programme of lectures and demonstrations has been planned. Yet another branch has been formed at Berwick-on-Tweed under the chairmanship of Mrs. Sprunt.

Whitworth Scholarships to be awarded in 1953

AN announcement has been made by the Minister of Education concerning the Whitworth scholarships to be offered for competition in 1953. The awards to be made will be two senior scholarships tenable for two years and valued at £325 p.a., five scholarships tenable for three years and valued at £200 p.a., and up to ten prizes of £20 each. They are intended to enable the holders to pursue their studies in engineering. Subjects on which competitors will be asked to submit a thesis include Variable speed a.c. motors, Gas turbines, Vibrations in mechanisms and structures, and Performance of machine-tools.

Full details of conditions of entry and entry forms may be obtained from the Ministry's Awards Branch in Curzon St., London.

Recent shoplighting installation carried out by Franco-British in London's Shaftesbury Avenue

Educational Posters on Power Production

FOUR coloured posters depicting scenes inside power stations, with explanations, have been produced by the B.E.A.'s Education and Training Department. They are oblique projections in part section and measure 40 in. by 30 in. The first shows a coal and ash handling plant, the second a boiler house, and the third a modern turbo-alternator. The fourth poster shows both the inside of a power station and the equipment of an outdoor grid substation. These pictures are primarily intended for use within the industry, but it is probable that many colleges and schools will find them most useful. Single copies of the posters on cartridge paper will cost 7s., and a set of four 22s. 6d. Linen backed posters are priced at 9s. per copy and 31s. 6d. a set. Limited supplies are available from Mr. L. J. Luffingham, P.R.O., British Electricity House, Winsley Street, W.1.

Louvred Lighting for Shop Windows

LOUVRED lighting for shop window displays has probably not reached its peak in this country yet. An example of this type of installation may now be seen in the Shaftesbury Ave. (London) shop of S. Weiss, Ltd. A plastic louvre of 2-in. cells has been introduced into all four windows and part of the interior. Warm-white, cold cathode lamps and tungsten spotlights provide the illumination, and the translucency of the louvre does not bring about any appreciable absorption of light. Three control units enable the light output of individual windows to be controlled separately and in that way the volume of illumination can be reduced to 75%, 50% or 25% of the maximum. Architect was Mr. E. Goldfinger. The installation, including the Luxolite diffusing screen and control system, was carried out by the Franco-British Electrical Company, Ltd.

A.E.M.T. EXTENDS SUMMER CONVENTION PLANS

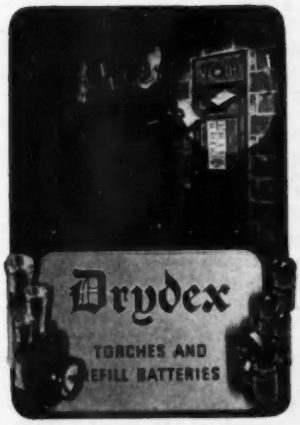
ONCE again the Savoy Hotel, London, was the scene of a successful Association of Electrical Machinery Trades' annual dinner last week, when this pleasant function was held under the chairmanship of Mr. J. A. Hardy. Members of the Association from all over the country were welcomed by the chairman, who in the course of his short speech made special mention of the Association's 1953 summer convention. This has been planned for Eastbourne, and as a new departure delegates' ladies were to be included in the arrangements.

The principal speaker of the evening was Mr. A. L. Johnson, chairman of the education committees of the Tin-Plate Workers Company and of the British Non-Ferrous Metals Association. Commenting favourably on the education scheme which the A.E.M.T. was drawing up, he appealed for attention to the general, as well as the technical, education of the students.

With speeches finished, the Association's members and their guests proceeded to make their seventh dinner-dance as memorably enjoyable as its predecessors, taking care to provide some handsome support for the E.I.B.A. as part of the proceedings.

Ministry Approval for Zebra Crossing Equipment

IN view of the countrywide demand now for lighting equipment for pedestrian crossings we note that the Ministry of Transport has agreed to Venner Ltd.'s beacon flashes and boxes for production. We understand that formal approval merely awaits inspection of the first unit. Delivery of the equipment is expected to start in the middle of next month.



This new showcard in 11 colours has just been produced by Chloride Batteries Ltd. for window displays of their agents. It is in two sizes, 30 in. by 20 in. and 40 in. by 27 in.

HENLEY TENTH CONVERSAZIONE

NOW a well-established annual event, the tenth Conversazione of the Henley Education Scheme was held last Saturday at Woolwich Polytechnic under the chairmanship of Mr. W. F. Bishop, C.B.E., a director of the Henley Organisation. Sir Montague Hughman presented prizes to successful students of the scheme, of whom a record number had attained scholastic success in the past year.

This year the principal speaker at the function was Mr. Stuart Hibberd, who had many interesting stories to tell of his 25 years of broadcasting. He was followed by Mr. Alan Pine, a student apprentice employed at the Organisation's Birtley Works who expressed the gratitude of the students generally for the educational facilities made available, and for the encouragement offered by the directors.

In connection with the Conversazione, there was an exhibition of students' work, together with a short play written by Mr. F. Davis (Research Labs.)

E.C.A's 1953 CONFERENCE

IT is understood that next year's conference of the Electrical Contractors' Association may be held at Bournemouth. Negotiations for the venue of the 1953 conference are proceeding and the Bournemouth Corporation has been approached.

A newly designed window bill, showcard and poster, for Atlas fluorescent lamps produced by Thorn Electrical Industries Ltd. for issue to their customers. The three power station chimneys are represented by fluorescent tubes

NEWS IN BRIEF

E. K. Cole, Ltd., have announced an extension to the existing apprenticeship scheme to cover the additional grade of student apprentice.

Birmingham Electric Club's ninth annual Children's Party will be held at the Grand Hotel on January 3 between 3 p.m. and 6 p.m.

Electrification of 16 motorbus routes has been suggested to Walsall town council.

London Transport has bought 50 new trolleybuses for use in S.W. London. They are 8 ft wide instead of 7½ ft and have wider gangways but the same seating capacity as previous buses.

A second edition of S.I.M.A.'s brochure "Radio Isotope Applications" has been published. It summarises all the equipment necessary for use with radio isotopes and lists U.K. sources of such equipment.

J. and G. Coughtrie Ltd. have asked us to note that the reference to Catalogue No. 511 in their advertisement on page 11 of our November 6 issue should have read Catalogue No. 522.

Questions in Parliament . . .

Electricity in Scotland

The attention of the House at the moment centres on the debate on the Address. As reported last week, H.M. the Queen made only brief reference to the electrical industry, mentioning that electricity supplies in Scotland were being attentively examined. First reference to this part of the Queen's speech was made the same afternoon by Mr. John Rankin. He said the Government had been pecking at the problem for some time and asked whether the examination and proposed legislation would have any bearing on the future of the N. of Scotland Hydro-Electric Board. He submitted that the N. of Scotland Board was different in its perspective, its functions and its powers than either of the other two Scottish Boards, which were concerned solely with supplying electricity.

Mr. Rankin maintained it would be a backward step if the H.-E. Board was identified with the S.E. and S.W. Boards. The Board's most important task probably was to work for the economic development and social improvement of the Highlands—a unique function. He asked that long and careful consideration be given to any action which might imperil the status or duties of the N. of Scotland Board.

On the following day (Wednesday) Lt.-Col. W. Elliot also asked that the H.-E. Board should not be interfered with. He hoped that electricity in Glasgow and Edinburgh would be regulated from the Scottish capital rather than from Whitehall, and that the examination would soon result in fruition, and legislation would be introduced at an early date. Mr. T. Hubbard wondered whether in view of the talk about deflationary policy and savings there was to be a standstill in the development of Scottish industry and whether the hydro-electric scheme was to be developed in the way planned originally.

Monopolies Commission

In his speech early on the second day of the Debate on the Address, Mr. Hugh Dalton raised the question of the Monopolies Bill. He asked what had happened to it in view of the fact that it was promised a year ago in the King's Speech. In addition, great importance had been attached to strengthening the Commission's powers in a previous debate. Mr. Dalton said there were a number of monopolistic and restrictive practices in private enterprise which kept prices higher than they ought to be. Replying to this Mr. Peter Thorneycroft said he shared the regret, but it was impossible to accommodate the Bill in the programme for this year. It was still intended to introduce such a Bill, particularly as the Government considered that nationalised monopolies should be treated on the same basis as private monopolies.

Britain's Trade

Mr. Thorneycroft also mentioned a number of other facts in the course of his speech. Saying that factors which helped the U.K. balance of payments did not necessarily operate in favour of the export trade, he spoke of an improvement in the terms of trade. Although not wishing to foreshadow the sudden lowering of physical trade barriers, he pointed out that manufacturers should not regard import quotas as part of the permanent paraphernalia of commercial policy. Mr. Thorneycroft also referred to the importance of expansion in the S. American market, and to the trade mission to that continent. He praised the good work done by the engineering students' mission sponsored by the F.B.I.

Electricity Charges in S. Wales

The subject of electricity tariffs was raised at question time on Monday when Mr. Callaghan asked if the Minister was doing anything to forbid undue discrimination in the compilation of tariffs. Mr. G. Lloyd said he was not. The basis of Mr. Callaghan's remarks centred on the position in Cardiff (reported elsewhere in this issue). He pointed out that in assessing houses rooms were taken into account even if they were not fitted with electricity. Mr. Lloyd stated that tariffs in that area were being standardised. He queried whether the questioner considered the principles of the tariffs which had been approved by the Government. Under those principles the basis of the number of rooms was recommended and he did not consider that method of assessment wrong.

The Severn Barrage

The Minister of Fuel and Power was asked when the proposed new model of the Severn Barrage would be available, and what further action was being taken in the prosecution of the scheme. Mr. Lloyd stated in a written answer that they were having to wait for the new model which, he had been informed, would probably be ready in about two or three years.

Electrical Plant Committee

Replying to questions about the Heavy Electrical Plant Committee, Mr. Duncan Sandys said that the advisory body was first constituted by the Ministry of Fuel and Power in 1944. Two years later it was transferred to the Ministry of Supply and between 1950 and 1952 its meetings lapsed. The Minister added that at the request of the industry the Committee had been reconstituted last May. The Minister was also questioned concerning the appointment of Mr. Frank Foulkes, of the Electrical Trades Union, as a member of the Committee and he replied that this was a matter which concerned the trade unions rather than the Government.

Electric Supply News . . .

Aberdeenshire

The village of Gartly, a few miles south of Huntly, Aberdeenshire, and a number of farms between those two places have received a supply of electricity for the first time with the completion of the first section of the North of Scotland Hydro-Electric Board's distribution scheme for the Huntly area. In all 39 consumers will be connected. The supply will be extended to the villages of Rhynie, Lumsden and Kennethmont, and to many crofts and farms in Strathbogie.

Argyllshire

The Secretary of State for Scotland has confirmed another scheme prepared by the North of Scotland Hydro-Electric Board. Intended to meet the increasing demands of the Oban area, the project will develop the resources of Loch na Sreinge, Loch Tralaig, the River Oude, and tributary streams in the Kilmelfort district of Argyll. It is estimated that the scheme will cost £485,000 and will produce 9 million units of electricity a year. Under the scheme two dams will be built—one to raise the level of Loch Tralaig and the second to form a headpond in the Pass of Melfort. A 3,000 kW power station will be erected on the right bank of the River Oude above Melfort House.

Bristol

The Corporation's Hartcliffe housing estate, where 3,500 dwellings and shops are ultimately to be erected, is rapidly taking shape. The first flat to be completed has been equipped by the South Western Electricity Board to show the various electrical appliances in the home. The kitchen contains an electric cooker, kettle, table-top refrigerator, a small washing machine and a clock. New dwellings on the estate have a power point in each room and in the cupboard containing the hot-water tank. Provision of electricity supplies to Hartcliffe and the neighbourhood unit, Bishopsworth South, where 1,750 dwellings and shops will probably be erected, necessitates the laying of nearly 28 miles of h.v. and l.v. cable and the installation of 20 substations. Supply is taken at 11 kV from the Feeder Road distribution centre. To date 4,300 yds of h.v. and protection cable and 9,000 yds of l.v. cable have been laid.

Douglas (I.O.M.)

Due to the entire cessation of the bulk supply to the Isle of Man Electricity Board, the output of the Borough of Douglas Electricity Department during the year ended March 31 last dropped by 3·6 million units to 20·1 millions. Electricity consumed in the Corporation's area of supply, however, rose by 9·16% to over 18 million units, and a further 458 consumers were connected. The loss of the bulk supply was also responsible for a deficiency on the year's operation despite an increase of £28,287 in revenue. The deficiency has been limited to £18,355 by the temporary suspension of a portion of Sinking Fund payments. The change-over of the distribution system from d.c. to a.c. was completed in the year. Under that scheme a total of 4,125 consumers' installation have been dealt with. Extending the Pulrose power station, the new 5,000 kW turbo-generator is ready along with one boiler.

Durham

The Rural Council has accepted revised terms from the North Eastern Electricity Board for a proposed 20 kV overhead line at Coxhoe. The Council originally objected to the proposal because it crossed land intended for houses. The Board has proposed that the line should be diverted or placed underground on six months' notice if it was likely to interfere with building operations.

Norwich

The B.E.A. has offered the Corporation £12,000 for the purchase of about 13 acres of freehold land required for the proposed South Denes generating station. The Council has been recommended by the Property Committee to accept the offer.

N. of Scotland

The benefits of hydro-electricity to Caithness, Sutherland and Ross and Cromarty was the subject of a paper presented by Mr. Thomas Lawrie, general manager of the North of Scotland Hydro-Electric Board, at the Three Counties Conference of the Scottish Council of Social Service on Tuesday. Utilising wall maps, Mr. Lawrie explained that distribution systems erected, in hand or authorised will serve a total of 16,330 consumers in the area. Three power schemes, Fannich, Lochalsh and Gairloch, with a total capacity of 26,450 kW, are already in operation. Two others, with an aggregated capacity of 71,200 kW, are under construction, while the 44 MW Loch Shin and 18 MW Orrin were two others now being promoted. Mr. Lawrie then went on to explain how delays in starting on a scheme were caused by the necessity to consult various interested organisations. Finally, he dwelt on the need for farmers to adopt mechanical methods and the comfort and convenience in the home which electricity can bring.

South-west Scotland

Reinforcement of the network between Tongland, Castle Douglas and Dalbeattie in the Stewartry of Kirkcudbright, at a cost of nearly £92,000, has been agreed upon by the South West Scotland Electricity Board. At present the area is supplied from the Tongland hydro-electric station via 11 kV overhead lines, but owing to the increase in load it has been decided to re-insulate the two lines between Tongland and Dalbeattie,

a distance of some 24 miles, to operate at 33 kV, and to erect 33/11 kV outdoor substations at both places. It is anticipated that the work will be completed by 1955.

York

The B.E.A. has received the consent of the Ministry of Fuel and Power to the installation in the Foss Islands, York, power station of one 20 MW turbo-alternator and two 100 klb/hr boilers. These will replace the plant which was destroyed when a boiler exploded in the station in October, 1949.

LIGHTING SCHEMES

Brighouse.—The T.C. is seeking loan sanction for a proposed scheme for improved lighting in the town centre.

Croston (Lancs.).—Parish Council has approved a new lighting system to cost £3,000.

Durham.—The County Council has consented to the borrowing of £3,000 by Trimdon Parish Council for the provision of electric street lighting.

Durrington.—The Parish Council is approaching the Southern Electricity Board regarding modernising the street lighting.

Eton.—The U.D.C. has been recommended to prepare a scheme for street lighting for the whole of the East Ward, including Eton Wick.

Oxford.—To convert the existing street lighting from gas to electricity would cost over £70,000, it is estimated. It is proposed, therefore, to defer consideration of the matter.

Ramsgate.—The Franco-British Electrical Co. is terminating its agreement with the council concerning the illuminations. The provision of a new scheme on the East Pier to replace the Pier of Fantasy is to be discussed by the Illuminations Committee.

Sheffield.—It is proposed to install sodium lighting in Norfolk Street, Union Street and Howard Street as money and materials become available.

Southport.—The Lighting Committee has a number of schemes in mind in connection with the Coronation celebrations. Ideas already submitted include a plan for illuminated flower baskets in the streets.

Spondon.—M.o.T. is prepared to make a grant towards the installation of improved lighting in Nottingham Road, the parish council has been notified.

Stoke-on-Trent.—The Highways and Plans Committee have approved schemes for improved lighting in Davenport Street, Browhills Road, High Lane and Hanley Road, at a cost of £9,385, and also propose to erect 603 lights on 14 housing sites at a cost of £16,281.

Sutton and Cheam.—The borough engineer is to prepare plans and invite tenders for the installation of improved street lighting in various roads.

Trowbridge.—The U.D.C. has approved an extension to the new street lighting scheme, to cost £18,000.

Company Activities . . .

H. J. Baldwin & Co.

Arrangements for the issue of the additional 100,000 £1 6% cumulative Preference Shares approved at the meeting a year ago, and for which Treasury sanction has been received, will be made known to shareholders when market conditions are favourable, Mr. H. J. D. L. Walmsley, chairman states.

Bakelite Ltd.

Warning of a falling off in sales since May is given with notification of an interim Ordinary dividend of 3%. The overall amount distributed, however, remains the same as last year, as since then the Ordinary capital has been doubled by capitalisation of reserves. Apart from the reduction in sales noted, the total turnover for the ten months of the year is comparable with that for the similar period of 1951, it is stated.

Burco, Ltd.

The profit for the year to September 30 last decreased slightly to £54,281, after providing for increased taxation, and placing £8,000 (*nil*) to stock reserve. The final dividend is 25%, making a total of 35%, as against 38¾% for the previous year.

Thomas De La Rue and Co.

Shareholders are unlikely to receive any dividends for the current year, it seems. The directors last week announced that it had been decided not to pay an interim, and they consider it improbable that any final dividend will be recommended. It is clear that the profit for the year to next March will be greatly reduced, they add, for the slight improvement in sales to which the chairman referred at the annual meeting in July has not been maintained.

East African Power and Lighting Co.

As forecast when the Ordinary capital was increased last June, the total distribution for 1951 has been maintained at 7% by the proposal to pay a final dividend of 4%. Encouraging also is the increase in the group profit, after charging depreciation, from £279,442 for 1950 to £310,426 for last year.

Falk, Stadelmann and Co.

Achieving a record turnover during the year, this company reports a gross profit £90,000 up on the previous year's total. Net profit, however, is slightly reduced, as will be seen from the table on page 903. To sustain the higher turnover corre-

spondingly larger stocks had to be carried. This is reflected in the bank overdraft, which rose from £1,436 to £148,533 by the end of March. However, since the beginning of the present financial year an appreciable reduction in stocks has been made, states Mr. H. Falk, the chairman. Apart from considerable activities in the home market, the company is continuing to concentrate on the export side. In South Africa, it is building a factory, considered essential in view of the growing tendency throughout the Union to restrict imports and encourage local manufacture.

Year to Mar. 31	£ Trading Profit	£ Available for parent Co.	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	499,543	157,388	44	15	51/10	40/-
1949	516,565*	144,980	40	15	47/3	35/7
1950	484,562	168,374	48	15	43/-	31/3
1951	572,541*	194,329	55	15	50/-	40/6
1952	662,419	183,708	49	15	41/3	34/3

* Including interest on War Damage Payments.

Longmore Brothers

A notable increase in profits in its first full year as a public company is reported by this concern of steel tube and conduit manufacturers. For the year ended August 4 last, the net profit after all charges is £38,420 compared with £13,998 for the previous period. The figure is arrived at after a substantial increase in the taxation provision. The dividend also is raised to 15%.

Oliver Pell Control Ltd.

An encouraging improvement in the trading profit for the year to March 31 last is reported. At £33,193 the figure is almost three times the total for the previous period. The net profit is £20,975, but no provision has been made for income tax or profits tax as these have been absorbed by previous losses.

Palestine Electric Corporation, Ltd.

Large-scale expansion of power generation facilities is needed, but the company has met difficulties in regard to obtaining the necessary capital while the question of raising tariffs in order to pay dividends is outstanding. Now the company has been given three months in which to raise substantial amounts of foreign capital.

Perak River Hydro-Electric Power Co.

Despite the unsettled conditions prevailing in Malaya, the report and accounts again indicate progress. An increased number of units were generated at the Chenderoh hydro-electric station, but total operating expenses were nearly £50,000 up, due chiefly to the increased cost of labour and materials as the result of the boom conditions which prevailed following the outbreak of war in Korea. The company's war damage claim was finally assessed by the Claims Commission at £537,354 and a first interim payment of £161,206 has been received, states Mr. Hugh G. Balfour, the chairman. Preference dividends for the past eight years have now been paid, but there has been no Ordinary distribution since 1941.

Year to July 31	£ Gross Revenue	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	791,503	211,243	18*	—	16/3	12/-
1949	827,257	85,863	5½*	—	14/1	9/6
1950	971,338	147,029	12*	—	12/6	7/6
1951	1,138,781	164,201	14*	—	14/-	8/3
1952	1,266,709	132,777	11	—	14/3	10/9

* After allowing one year's Pref. dividend.

Rawlings Bros.

After charging taxation, etc., the net profit for the year ended March 31 last is £6,782, against £6,505 for the previous year, and the Ordinary dividend is again 7½%. The group accounts, however, show a net trading loss of £41,658. On this, Mr. W. R. Rawlings, chairman, says the accounts of the subsidiary, Styles (Contractors) Ltd., disclose a severe loss on several of the large contracts which were completed during the year. Appropriate steps have been taken to avoid such a recurrence, and the subsidiary is now engaged on profitable work on a smaller scale.

Sun Electrical Co., Ltd.

A sharp decrease in profit for the year to April 30 last, is recorded in the preliminary statement. After charging reduced taxation, the profit figure was £33,057 as compared with £44,249 for the previous year. The dividend is again 15%.

Switchgear and Cowans, Ltd.

Ordinary shareholders are to be offered 100,000 5s. shares at 10s. each on the basis of one new for every six held. The issue has been underwritten by the Standard Industrial Trust, which in addition, is to procure subscriptions for £200,000 5½% First Mortgage Debenture stock in the company at par. Net proceeds of the two issues are estimated at £244,250 which is to be used to repay the bank overdraft and in general placing the company's finances on a sounder and more permanent basis. In the absence of unforseen circumstances the board intends to recommend the same dividend as last year (20% plus 2½% bonus) on the increased capital. The current results of the subsidiaries are not as good as at the beginning of the year, the directors state, but the profits of the group as a whole for the current year should be in excess of those earned last year.

Tube Investments

With a final Ordinary dividend of 7½%, and an adjustment of ¾% payable on the capital increased by 100% capitalisation of reserves, the distribution for the year to the end of July last is equivalent to 15% on the higher capital. The trading profit for the year ended July 31, last, is £9,056,595 after depreciation, against £7,431,189 for the previous year. Regarding the larger profit figure, the directors stress, in the preliminary statement, that about £1 million of this is of an exceptional nature and represents a realisation of the appreciation in the value of stocks following two increases in steel prices during the year.

Dividends Declared

Associated British Engineering Ltd.—Interim Ordinary dividend of 3%.

Dictograph Telephones Ltd.—Final dividend 10% making 20% (*same on smaller capital*). Consolidated profit £58,731 (*£56,695*).

Commercial Information

CONTRACTS OPEN

HOME

Nov. 17.—Edinburgh. Electrical and heating installations in Carrick Knowe primary school. City Architect, City Chambers.

Nov. 17.—Stretford T.C. Electrical installation in 146 flats and maisonettes on Stretford Rd. and Thomas St. sites. A. H. Perry, Borough Surveyor, Town Hall. Deposit £2 2s.

Nov. 17.—Sunbury-on-Thames U.D.C. Wiring and equipping for lighting of about 32 houses in Nursery Rd. and Layton's Lane. Engineer and Surveyor, Council Offices.

Nov. 17.—West Riding. Conversion from gas to electrical installation at Wombwell Park St. J.M. school. County Architect, "Bishopgarth," Westfield Rd., Wakefield.

Nov. 18.—Ilford T.C. Supply of 20 a.c. and 20 d.c. flasher units with housings and 20 housings for interconnecting with d.c. flashers; and also 60 globes, galleries and lampholders for pedestrian crossing lighting. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s. (See Oct. 30 issue.)

Nov. 18.—Docking (Norf.) R.D.C. Wiring of workshops, offices, etc., for Waterworks Depot. G. E. Gibson, housing officer, Council Offices, Docking, King's Lynn.

Nov. 18.—Musselburgh. Erection of 69 lamp standards and installation of mercury lamps in Pinkie Braes scheme. Burgh Surveyor, Municipal Offices, High Street.

Nov. 19.—Tyrone. Electrical installation at Kilskerry primary school. A. Gibson, chief education officer, Education Offices, Omagh. Deposit £2 2s.

Nov. 19.—Wanstead and Woodford B.C. Supply of equipment for lighting 10 pedestrian crossings. Borough Engineer and Surveyor, Municipal Offices, High Road, E.18.

Nov. 20.—Worsley U.D.C. Supply of equipment for illumination of pedestrian crossing beacons. L. T. Broome, Town Hall, Walkden.

Nov. 20.—Belfast. Electrical installation for kitchen equipment at Annadale grammar school. Education Architect's Dept., 40 Academy Street.

Nov. 20.—Coulsdon and Purley U.D.C. Supply and erection of equipment for lighting of 19 pedestrian crossings. Engineer and Surveyor, Council Offices, Purley.

Nov. 21.—Belfast. Supply and erection of workshop machinery equipment, including 12¾ in. and 6¾ in. centres surfacing and screwcutting of gap bed lathes, radial drilling machines, sensitive drilling machine, and 24-in. shaping machine, for Harbour power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Oct. 23 issue.)

Nov. 21.—Edinburgh. Electrical work for north development (56 houses), west devel. (44 houses) and east devel. (18 houses and 12 shops) on Drylaw Mains site. City Architect, City Hall.

Nov. 22.—Banbury T.C. Supply and installation of equipment for illumination of pedestrian crossing beacons. Borough Engineer and Surveyor, Municipal Buildings.

Nov. 22.—Wakefield R.D.C. Electrical installation in 58 houses on sites within the rural district. Council's Engineer, Council Offices, 18 St. John's North.

Nov. 24.—Edinburgh. Electrical installation in 136 houses in Inch Housing area B. City Architect, City Chambers.

Nov. 24.—Nuneaton T.C. Provision and installation of sodium street lighting over about 1,530 yds. to Group A standard. Borough Surveyor, Council House. Deposit £2 2s. (See Nov. 6 issue.)

Nov. 24.—West Riding. Modifications and repairs to electrical installations at Holme Valley grammar school. County Architect, "Bishopgarth," Westfield Rd., Wakefield.

Nov. 24.—Boston R.D.C. Electrical pumping machinery required for Bulterton Re-Pumping Station. S. M. Forman, clerk of district council, 126 London Rd. Deposit £3 3s.

Nov. 24.—Sale T.C. Electrical installations for 40 dwellings, 40 houses and 24 houses on Oakley Farm estate, and 46 dwellings and 50 houses on Baguley Lane estate. These are all separate contracts. Borough Engineer, Town Hall. Deposit £2 2s.

Nov. 24.—Manchester. Electrical installations for shops and maisonnettes at Northern Moor N.W. sub-centre and Sharston and Benchill S.E. sub-centre. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue).

Nov. 25.—Newbiggin-by-the-Sea U.D.C. Electrical work in 12 houses on Spital Estate. H. Selby Robson, Surveyor to Council, Council Offices. Deposit £2 2s.

Nov. 26.—West Hartlepool T.C. Electrical installation in new Rossmere primary school. Borough Architect, Municipal Buildings.

Nov. 26. — Carmarthenshire. Supply of 28 beacon globe assemblies and equipment for pedestrian crossings. J. L. Richards, county engineer and surveyor, Roads and Bridges Dept., County Hall, Carmarthen.

Nov. 28.—Heckmondwike U.D.C Electrical work in 14, 6 and 8 houses (three contracts) on Dale Lane estate. Council's Surveyor, J. K. Gerlick, 6 Church St. Deposit £2 2s.

Nov. 28.—Stepney B.C. Electrical installation in blocks of flats in Sidney St. scheme. Sydney Clough, Son and Partners, Devonshire Close, 39 Devonshire St., W.1. Deposit £2 2s. (See Oct. 23 issue.)

Nov. 29.—Stalybridge T.C. Conversion of street lighting from gas to electricity, comprising supply of swan necks to existing columns, new concrete columns, 80 W H.P.M.V. lanterns, time switches, etc., for some 420 lamps. G. D. Sanderson, Borough Engineer, Town Hall.

Nov. 30.—Tottenham B.C. List of supplies required during year beginning April 1, 1953, includes electric lamps. Applications to M. Lindsay Taylor, Town Clerk, Town Hall, N.15.

Dec. 1.—Chippenham. Rewiring for power, lighting, patients' call system and radio system at St. Andrew's Hospital. A. N. Irens, consulting engineer, Haycroft, Filton, Bristol. Deposit £2 2s. (See Nov. 6 issue.)

Dec. 1.—East Riding. Installation of electrical services at Cottingdean secondary school. Application to County Architect, County Hall, Beverley.

Dec. 1.—Manchester. Electrical installation at F. Home, "Newholme," Nell Lane. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

Dec. 1.—St. Helens T.C. Supply, erection and wiring of 66 concrete standards with 250 W H.P.M.V. lanterns for new street lighting scheme. M. Ward, Borough and Water Engineer, Town Hall. Deposit £2 2s.

Dec. 1.—West Riding. Renewal of electrical installation at Elland grammar school. County Architect, "Bishopgarth," Westfield Rd., Wakefield. Deposit £2 2s. (Advertised in this issue.)

Dec. 10.—Ilkley U.D.C. Installation of mercury lighting (involving 62 columns) in new street lighting scheme. Council's Surveyor, Town Hall. Deposit £3 3s.

No date stated.—Hastings T.C. Electrical installation in 122 dwellings at Harley Shute estate. Borough Engineer, 37 Wellington Square. Deposit £2 2s.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

Dec. 2.—Brazil. Supply of two electric current rectifiers of identical characteristics for parallel or single connection. Departamento Estadual de Portos, Rios e Canais, Praca 3 de Outubro, Porto Alegre. B.o.T. (Ref.: CRE 36782/52).*

Dec. 3.—New Zealand. Posts and Telegraphs Dept. requires supply of 12 portable, permanent magnet, moving coil, multi-range meters, minimum scale length 3 in., 10 V to 500 V a.c./d.c., 10mA to 10 A. Director-General (Stores Div.), G.P.O. Wellington. B.o.T., (Ref.: CRE 36580/52).*

Dec. 4.—South Africa. Supply of 12 electric drilling machines portable, ½ in. capacity, with socket cable, earth wire and plug —two for 230/250 V a.c. 50 c/s and ten for 220/230 V a.c. 50 c/s. Union Tender and Supplies Board, 271 Visagie St., P.O. Box 371, Pretoria. B.o.T. (Ref. CRE 36916/52).*

Dec. 23.—India. Supply of compounded steel tape or bright steel tape (uncompounded) for telephone cable factory at Chitteranjan. Documents at 10s. each from Director-General India Store Dept., 32/44 Edgware Rd., London, W.2. (Advertised in this issue.)

Jan. 14.—Portuguese West Africa. Supply and installation of electric power transmission line from Matala H.-E. station to substation at Sa da Bandeira. Total distance is about 200 km. Direcco-Geral do Fomento, Praca do Principe Real 13, Lisbon. B.o.T. (Ref.: CRE 35145/52).*

Jan. 13.—Portuguese West Africa. Supply and installation of electro-mechanical equipment for Cunene River H.-E. scheme at Matala, including turbo-alternator sets, transformers, etc. Direcco-Geral do Fomento, Praca de Principe Real 13, Lisbon. B.o.T. (Ref.: CRE 35313/52).*

Jan. 15.—Brazil. Para State Govt. invites tenders for supply of power plant for new power station, including fuel-oil boilers, turbo-generators, transmission lines, etc. Specifications from Forca e Luz do Para, S.A., Belem, Para, Brazil.

Feb. 16.—New Zealand. Supply of 6,600 V switchgear and associated equipment for Glen Innis substation. Auckland Electric Power Board, Queen St., Auckland. B.o.T. (Ref.: CER 36988/52).*

CONTRACTS PLACED

Barry T.C. Installation of street lighting along approx. 3¼ miles of roads in borough, S. Wales Electricity Board.

Brighton T.C. Manufacture and supply of submersible electric pump for Goldstone pumping station, Hayward Tyler and Co. Ltd., £3,045.

Burntisland T.C. Installation of electricity in 207 houses at Rossend under three contracts, A. L. Paterson, £1,197; John Littlejohn, £1,260; and David Murray, £1,184.

Carlisle. Electrical installation in 130 new houses, N. Western Electricity Board.

Caerphilly U.D.C. Supply, erection and servicing of 42 group A lighting units along four roads, General Electric Co., Ltd., £4,336.

Cumberland. Electrical installation at Camerton hospital, George Bowman Ltd., £1,548.

Your Queries Answered

"Lumley" fire guards, makers of? E.C.—J. Broughton and Son Ltd., Vere St., Birmingham. (24348)

"Simplex" hairdryers, makers of? S.B.—These were made by I. Calvete Ltd., but try Osborne Garrett and Co. Ltd., 51 Frith St., regarding repairs. (24354)

"Acorn" coffee percolators, makers of? T.B.—Acorn and Lumium Sales Co. Ltd., Carlisle Rd., Colindale, N.W.9. (24361)

"Meadows" washing machines, repairers of? W.C.—Thor Appliances Ltd., 156 Dukes Rd., W.3. (24369)

"Esla" line fuses, makers of? W.H.—Electric Street Lighting Apparatus Co., Jewry Lane, White Horse Lane, Canterbury. (24372)

"P and B" instruments, address for? A.W.—Price and Belsham Ltd., 53 Victoria St., S.W.1. (24378)

"Master" washing machines, makers of? E.M.—We presume this refers to the "Washmaster" which was made by Roncar Ltd., Cobourg Wharf, Cobourg Rd., S.E.5. (24383)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

"Maison fittings", plastic lighting fitting, makers of? S.W. (24388)

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

W. R. Boot and Son, Ltd., 50 St. Peter's Av., Cleethorpes, Lincs. Electrical engineers and contractors, manufacturers of and dealers in wireless apparatus, etc. Cap.: £1,000. Dirs.: W. R. Boot and Mrs. J. C. Boot.

Curtis E. Ballin and Son, Ltd. 200 Studfall Av., Corby, Northants. Electrical engineers and consultants and electrical wiring and installation contractors, etc. Cap.: £1,000. Dirs.: C. E. Ballin and Mrs. E. M. Ballin.

Elliott Lester Manufacturing Co., Ltd., 137a Courtenay Rd., Woking, Surrey. Manufacturers of and dealers in domestic appliances, electric food mixers, etc. Cap.: £1,000. Dirs.: C. G. Elliott, H. B. Lester and C. H. Atkins.

Laver Construction Co., Ltd., Victoria House, Barkingside, Essex. General engineers, mechanical, motor, electrical, oil fuel, constructional, marine, civil and consulting engineers, etc. Cap.: £1,000. Dirs.: H. H. Laver and Mrs. K. H. M. Laver.

Littler Co. Ltd., 16 Manchester Sq., W.1. Automatic, precision, general, mechanical, electrical and radio engineers, etc. Cap.: £6,000. Dirs.: R. Littler and G. M. Littler.

H. E. Hawley (1952) Ltd. Electrical engineers and fitters, manufacturers of and dealers in motors, dynamos, etc. Cap.: £3,000. Dirs.: not named. Subs.: E. Glaze, Glyn Garth, Greenbank Rd., May Bank, Newcastle, Staffs. and W. H. Leese, 23 Capes Av., Tunstall, Stoke-on-Trent.

Holland Developments, Ltd., Northgate Hse., Sleaford, Lincs. To acquire from Joseph R. Holland benefit of invention for improvements in or relating to the automatic variation of compression ratios in internal combustion engines; motor, mechanical, electrical and general engrs., etc. Cap.: £1,500. Dirs.: J. R. Holland, H. H. Brown and R. H. Crawford.

Maclaren Bros. (Kennett), Ltd., Station Rd., Kennett, Cambs. Civil, mechanical, electrical and general engineers, public works contractors, etc. Cap.: £8,500. Dirs.: D. K. Maclaren and D. T. Maclaren.

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	285 0 0	—
LEAD, good soft pig (foreign)	96 10 0	113 0 0
" " " "English" quality ...	98 0 0	
TIN (99-99.76%) ... ... (Cash)	954½-955½	—
" (3 months)	937-937½	—
ALUMINIUM, commercial purity (del.)	166 0 0	—
ZINC	110 0 0	100 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.) ...	53 0 0	—
Mild Steel Tape (0.04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Element Manufacturing Co. (Birmingham), Ltd. First and final dividends of 6d. in £ payable at Office of Official Receiver, Somerset House, 37 Temple St., Birmingham, on Nov. 15.

Dudley Electrical (Wholesale) Supplies, Ltd. Petition for winding-up presented on Oct. 29 and is directed to be heard before High Court of Justice, London, on Nov. 17. Interested persons should communicate with A. E. Samuels and Co., 292 High Holborn, W.C.1, by Nov. 15.

Munday (Walthamstow) Ltd., refrigeration engineers. Meetings of creditors and contributories will take place at Inveresk House, Strand, London, on Nov. 18, at 11.30 a.m. and 12 noon respectively.

Relco Ltd. Resolution for voluntary winding-up passed at meeting on Oct. 29, when Edward Richmond, 6 Bishopsgate, E.C.2 was appointed liquidator.

Kenneth R. Barker Ltd., of Portchester, Hants. Noel G. Roberts, 4 Hanham Rd., Corfe Mullen, Wimborne, Dorset, has been appointed liquidator.

Keen Refrigeration Co. Ltd. Meeting of creditors will be held at 100 Park St., Grosvenor Sq., W.1, on Nov. 19 at 2.30 p.m.

Voluntary Liquidation

Ezee Appliances (Kingsbury), Ltd., manufacturers and dealers in electrical appliances. Meeting of creditors was held recently and a provisional statement of affairs submitted showing liabilities of £1,656 against assets estimated to realise £674, thus leaving deficiency of £982. Resolution passed confirming voluntary liquidation with Mr. S. Poynter of 1 Broadway House, Broadway, Mill Hill, London, as liquidator.

BANKRUPTCY ACTS

Intended Dividends

Chelmsford. Bertie A. Murton, electrician trading at 54 The Green, Writtle. Last day for receiving proofs, Nov. 18. Trustee is W. J. Wallis Hill, Official Receiver, Central Buildings, Matthew Parker St., Westminster.

London. Mervyn J. Haine and Mary E. Simpson, trading as Haine and Co., electricians, at 77 Westbourne Grove, W.2. Last day for receiving proofs, Nov. 24. Trustee is F. H. Langmaid, Bankruptcy Buildings, Carey St., W.C.2.

Appointment of Trustee

Bournemouth. Edward J. R, Tremlett, radio and electrical dealer, of 941 Wimborne Rd., Moordown, Bournemouth. Trustee is C. S. Dawson, C.A., Woolwich Chambers, Fir Vale Rd., Bournemouth.

Order Rescinded

Salisbury. Harold Cooke, trading as Western Wireless at 33 Fisherton St., Salisbury. Receiving order rescinded and petition dismissed as from Oct. 23. Debts paid in full together with 4% interest.

Dividends

London. Leo L. O'Connor, electrical engineer of 27 Wellington Sq., S.W.3. First and final dividends of 6d. in £ payable at Bankruptcy Buildings, Carey St., W.C.2, on Nov. 21.

First Meeting

London. Albert S. Fraser, trading as Electrical Maintenance Service Co. at 553 Romford Rd., Manor Park, E.12, and 1 Shrewsbury Rd., Forest Gate, E.7. Meetings will take place tomorrow (Friday) at Bankruptcy Buildings, Carey St., W.C.2, at 12 noon. Public examination will be on Jan. 22 at same address, at 11 a.m. Date of receiving order, Oct. 31.

BUSINESS PROSPECTS

HOME

Bedfordshire. Scheme approved for provision of laboratories, etc., at Kensworth primary school. Estimated cost £11,300.

Berwick-on-Tweed. J. Van Smirren, Ltd., of Edwin St., Boston, Lincs., are planning a new fish-canning factory.

Burnley T.C. All trades in erection of 52 dwellings on New Palace estate, Borough Engineer and Surveyor, 22-24 Nicholas Street.

Carlisle. Construction of 100 houses at Harraby. City Engineer is L. J. A. Stow, 18 Fisher Street.

Colwyn Bay T.C. Construction of 48 houses in Voryn Ave. N. S. Jeffrey, Borough Engineer and Surveyor, Town Hall.

Croydon. Hugh MacIntosh and Partners are architects for Castle Hill junior and infants' schools to cost about £130,000.

Doncaster T.C. Erection of 46 houses on Cantley estate. Borough Architect, 15 South Parade. Also, R.D.C. proposes to build 132 houses at Armthorpe, 150 at Askerne, 100 at Edlington and 122 at Rossington.

Edinburgh. Dean of Guild Court has approved scheme for 369 houses and 8 shops in Clermiston area at estimated cost of £589,000.

Eye (Suff.) T.C. Layout plans approved for 62 houses at Bellands Way.

Gateshead T.C. It is intended to spend about £840 installing fluorescent lighting, water heaters, wiring and switchgear, and a 5 kW diesel generator at South Dene Towers civil defence centre.

Harrow. Scheme submitted for an instalment of Pinner Park infants' school estimated to cost £19,725.

Hastings T.C. Scheme approved for erection of 36 flats and 10 houses on Gate Farm site, Hollington.

Hebburn (Dur.) U.D.C. 276 houses are to be built on Monkton Lane Mill estate.

Hornsey (Middx.) T.C. It is proposed to build some 36 flats and other dwellings in Sydney, Wightman, Fairfax and Southern Roads.

Inverness. Dean of Guilds Court has approved erection of ecclesiastical buildings at Dalneigh for Home Board of Church of Scotland.

Kiveton Park (Yorks) R.D.C. Construction of 180 houses at Dinnington and 266 at N. Anston. Council's Architect, B. D. Thompson, 83 Bridge St., Worksop.

Liverpool. Final layout approved of Deysbrook Lane estate providing for 772 dwellings.

Lowestoft T.C. Erection of 56 houses on Whitton estate. Borough Engineer's Office, 49 High Street.

Ludlow (Shrop.) R.D.C. It is intended to erect 284 houses in 22 parishes during the next five years.

Lytham St. Annes T.C. Consideration being given to erection of 104 houses near Hilton Avenue.

Manchester. Erection of 11 shops and maisonettes at Baguley. City Architect, Town Hall.

Middlesex. Next year's building programme includes first instalment of Harrow Technical College at Northwick Park, £330,000.

Newcastle-on-Tyne. Loan sanction for £168,431 being sought to carry out stage two of new college of technology in Northumberland Rd. Work is expected to start in March.

Newcastle-on-Tyne. J. G. Temperley, 66 Nunsmoor Rd., has prepared plans for factory extensions in Scotswood Rd. for Jobbing Purser and Co., Ltd.

Nottingham. Work will probably begin in new year on new union building for University. Estimated cost £400,000.

Oldham T.C. Erection of 32 houses on Limeside estate and 34 on Filton Hill estate. Cameron and Middleton, 21 Queen Street.

Petworth (Sus.) R.D.C. Erection of about 52 dwellings at Wisborough Green. Goodman and Kay, architects, "Milnwood," 13 North Parade, Horsham.

Stourbridge T.C. Erection of 447 houses, 68 flats and 12 bungalows (divided into six groups) on Pedmore Fields estate. G. N. Maynard, Borough Engineer and Surveyor, The Council House.

West Hartlepool T.C. The erection of 264 houses, 128 flats and 14 bungalows on Seaton Lane estate is being planned.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

B. Burroughs, with design B687,597 and **Burroughs** 687,600. Class 7. Electric motors for use with office machinery. Burroughs Adding Machine Ltd., Avon House, 356/366 Oxford St., W.1.

Magnadur. 710,956. Class 9. Permanent magnets. Mullard, Ltd., Century House, Shaftesbury Avenue, W.C.2.

Neviol. 710,956. Class 9. Signs, advertising devices and display devices all being luminous apparatus. Neviol Equipment, Ltd., 5 Urswick Rd., E.9.

Solwarm. 708,061. Class 9. Electrically heated blankets. Robert Holt (Middx.), Ltd., Florence Buildings, Florence Rd., Edmonton, N.18.

Solvar. 708,200. All goods in Class 17. Metropolitan-Vickers Electrical Co., Ltd., 1/3 St. Paul's Churchyard, E.C.4.

Swordfish. 710,369. Class 9. Radio apparatus etc. Rees Mace Marine Ltd., 11 Hinde St., W.1.

Syncropulse. B707,186. Class 9. This registration includes cinematographic and magnetic sound recording apparatus. Leevers-Rich Equipment Ltd., 80 Wardour St. W.1.

TRADE NOTES

Change of Address. The London office sales staff of the David Brown Companies have moved to 96 Piccadilly, London, W.1. Tel.: Grosvenor 7747.

Acquisition. Reilight Ltd. have acquired the business of Reigate Electrical Co., 51 London Rd., Reigate, and are operating from that address.

Saturday Service. Sloan Electrical Co. Ltd. ask us to state that their trade counters throughout the country are open on Saturday mornings from 8.30 a.m. to 12 noon, the telephones being manned during this period.

MEETINGS TO NOTE

THURSDAY, NOV. 13

E.P.E.A. (Merseyside Tech. Group).—"Power Station Layout." S. D. Whetman. Elect. Showroom, Whitechapel, Liverpool, 7 p.m.

BRITISH INST. OF MANAGEMENT.—Annual conference opens at Harrogate and closes on Nov. 15.

INSTN. OF HEATING AND VENTILATING ENGRS. (Liverpool).—"Automatic Controls." F. M. H. Taylor, Radiant House, Bold St., 6.30 p.m.

INCORP. PLANT ENGRS. (Edinburgh Branch).—Annual dinner.

INCORP. PLANT ENGRS. (Newcastle-on-Tyne Branch).—"Gas and Oil Engines." A. C. Yeates. Roadway House, Oxford St., 7.30 p.m.

I.E.S. (Manchester Centre).—Annual luncheon and President's address.

I.E.E. (London).—"A 150 kV X-ray Equipment for Radiography of Circumferential Welds in Gas-Turbine Rotors." F. W. Waterton. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (E. Midland Centre).—"Electrical Engineering in Steel Tube Industry." H. E. Knight. George Hotel, Kettering, 7.30 p.m.

I.E.E. (N. Scotland sub-centre).—"Technical Colleges and Education for Electrical Industry." H. L. Haslegrove. Royal Hotel, Dundee, 7 p.m.

I.E.E. (Swansea sub-centre).—"Economics of L.V. Electricity Supplies to New Housing Estates." F. G. Copland. Central Public Library, 6 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Manchester).—"Radiant Heating." F. R. L. White. Engrs'. Club, Albert Sq., 6.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (London).—Social evening and dance at Bush House Restaurant, Aldwych, W.C.2.

INCORP. PLANT ENGRS. (Dundee Branch).—Annual dinner.

INCORP. PLANT ENGRS. (E. Midlands Branch).—Ladies' evening and dance at Black Boy Hotel, Nottingham.

I.E.E. (N. Midland Centre).—Annual dinner at Queen's Hotel, Leeds, 7.30 p.m.

I.E.E. (N. Staffs. sub-centre).—"Electronic Telephone Exchanges." T. H. Flowers. P.O. Central Training School, Stone, 7 p.m.

FRIDAY, NOV. 14

INSTN. OF MECHANICAL ENGRS.—Thomas Hawksley lecture on "Mechanism of Work-hardening in Metals." Prof. N. F. Mott. Storey's Gate, S.W.1, 5.30 p.m.

E.I.B.A. — Electrical Industries Ball at Grosvenor House, Park Lane, W.1.

MANCHESTER ASSOC. OF ENGRS.—"Instruments and Control Gear for Chemical Plant." A. Thompson and W. T. Thomas. Engrs'. Club, Albert Sq., 6.45 p.m.

E.P.E.A. (S. Meter Engrs. Group).—"Polyphase Metering Equipment." D. Nuttall, Caxton Hall, S.W.1, 6.30 p.m.

A.S.E.E. (Crewe Branch).—"Factory Installation Practice." C. Maddocks. Royal Hotel, Nantwich Rd., 7.30 p.m.

SATURDAY, NOV. 15

INCORP. PLANT ENGRS. (Glasgow Branch).—Annual dinner-dance at Burlington House, Bath St.

MONDAY, NOV. 17

I.E.E. (London).—Discussion on "Field of Application of Metal Rectifiers." S. A. Stevens. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Merseyside and N. Wales Centre).—"Inherent Current, Voltage and Speed Control in Dynamo-Electric Machinery." J. C. Macfarlane, J. W. Macfarlane and W. I. Macfarlane. Town Hall, Chester, 6.30 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"Microwave Radio Links." A. H. Starr and T. H. Walker. King's College, Newcastle, 6.15 p.m.

I.E.E. (Western Supply Group).—"Economics of L.V. Electricity Supplies to New Housing Estates." F. G. Copland. Elect. House, Colston Ave., Bristol, 6 p.m.

A.S.E.E. (N.W. London Branch).—"Main Line Traction." C. C. H. Wade. Prince of Wales Hotel, Kingsbury, 8 p.m.

TUESDAY, NOV. 18

BIRMINGHAM ELECTRIC CLUB.—"Storms in Sun Spots." Dr. Martin Johnson. Midland Hotel, 6.15 p.m.

A.S.E.E. (London).—"Research and Development of Crystal Rectifiers and Amplifiers—their Use as Tools in Industry." R. W. Douglas and E. G. James. Magnet House, Kingsway, W.C.2, 6.30 p.m.

INSTN. OF WORKS MANAGERS (Birmingham Branch).—"Production Planning for Mass Production." G. A. Poole of Joseph Lucas. Grand Hotel, 7 p.m.

INCORP. PLANT ENGRS. (Herts. Discussion Group).—"Plant Repair by Welding." K. K. Doherty of Lincoln Electric Co. Ltd. Peahen Hotel, St. Albans, 7.30 p.m.

I E.S. (Liverpool Centre).—"Design of Interior Lighting Equipment." L. H. Hubble. Elect. Board's Offices, Whitechapel, 6 p.m.

I.E.E. (London Measurements and Radio Sections).—"Harmonic Response Testing Apparatus for Line Systems," D. O. Burns and C. W. Cooper; also "Simple Connection between Closed Loop Transient Response and Open Loop Frequency Response," J. C. West and J. Potts. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (E. Midland Centre).—Discussion on "Problems concerning Application of Electronics in Heavy Industry." H. E. Knight. Elect. Showrooms, Derby, 6.30 p.m.

I.E.E. (S.W. Scotland sub-centre).—Dinner-dance at Grosvenor Ballroom, Glasgow, 6 p.m.

I.E.E. (Rugby sub-centre).—"275 kV Developments on British Grid System." D. P. Sayers, J. S. Forrest and F. J. Lane. Rugby College of Technology and Arts, 6.30 p.m.

WEDNESDAY, NOV. 19

INSTN. OF HEATING AND VENTILATING ENGRS. (Yorkshire).—"Atmospheric Pollution." E. M. Birtwistle. Hotel Metropole, Leeds, 7.30 p.m.

INCORP. PLANT ENGRS. (Kent Branch).—"Can Additives in Lubricating Oil help Plant Engineers ?" A. V. Driver. Bull Hotel, Rochester, 7 p.m.

I.E.S. (N. Lancs. Group).—"Industrial Lighting." W. Imrie-Smith. Chamber of Commerce, 49A Fishergate, Preston, 7.15 p.m.

A.S.E.E. (Manchester).—"Power Factor Correction." F. L. Johnson. Engineers Club, Albert Sq., 7 p.m.

I.E.S. (Tees-Side Group).—"Flash Discharge Tubes." Cleveland Scientific and Technical Instn., Corporation Rd., Middlesbrough, 6.30 p.m.

I.E.E. (Sheffield sub-centre).—"Use of Electricity in Modern Iron and Steel Works." W. F. Cartwright. Grand Hotel, 6.30 p.m.

A.S.E.E. (Coventry Branch).—"Development of Fluorescent Lamps." L. J. Hill. Technical College, The Butts, 7.15 p.m.

A.S.E.E. (S.W. London Branch).—"Scientific Thought." Dr. L. E. C. Hughes. Guild House, 32 Worple Rd., Wimbledon, 8.15 p.m.

THURSDAY, NOV. 20

INCORP. PLANT ENGRS. (Blackburn Branch).—"Care and Maintenance of Diesel Equipment." J. W. Armstrong. Chamber of Commerce, Richmond Terrace, 7.30 p.m.

I.E.S. (Gloucester and Cheltenham Centre).—"Lighting in Relation to Safety and Vision." E. W. Murray. G.E.C., 2 St. Aldate St., Gloucester, 6.15 p.m.

I.E.E. (London—Utilisation Section).—"Electricity in Farm Crop-Drying." C. A. Cameron Brown and P. G. Finn-Kelcey. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Irish Branch).—"Condensers and Power Factor Improvement." J. J. Morrissey, Trinity College, Dublin, 6 p.m.

A.S.E.E. (Kent Branch). "Principles underlying I.E.E. Wiring Regulations." J. J. Looker. Royal Star Hotel, Maidstone, 8 p.m.

A.S.E.E. (Liverpool Branch).—"Fluorescent Lighting and Dimming Control." Dr. Ballin. Elect. Service Centre, 9 Whitechapel, 7.30 p.m.

EXHIBITION DIARY

Business Efficiency Exbn. taking place at Kelvin Hall, Glasgow, closes on Nov. 14.

Cycle and Motor Cycle Show will be held at Earls Court, London, between Nov. 15 and 22.

London Medical Exbn. 35th show opens at New Horticultural Hall on Nov. 17 and closes on Nov. 21.

National Poultry Show opens at Olympia, London, on Nov. 20 and closes on Nov. 22.

Smithfield Show and Agric. Machinery Exbn. opens at Olympia, London, on Dec. 8, continuing until Dec. 12.

Henley Tape is a double coated Black Adhesive Tape for protecting rubber insulated joints and for all kinds of protective work. It is prepared from strong closely woven fabric treated with a special rubber compound by a process which ensures that the compound is forced into the texture of the fabric. Free from all deleterious substances and deliquescent salts, it is extremely tenacious, but clean to handle. It is strong but can be conveniently ripped across if desired. Henley Tape is supplied in wrapped rolls packed in cardboard cartons and containers. Complies with B.S. 1078:1942.

REDUCED SELLING PRICES

Please ask for prices and free sample.

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Sticks and Stays Stuck

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

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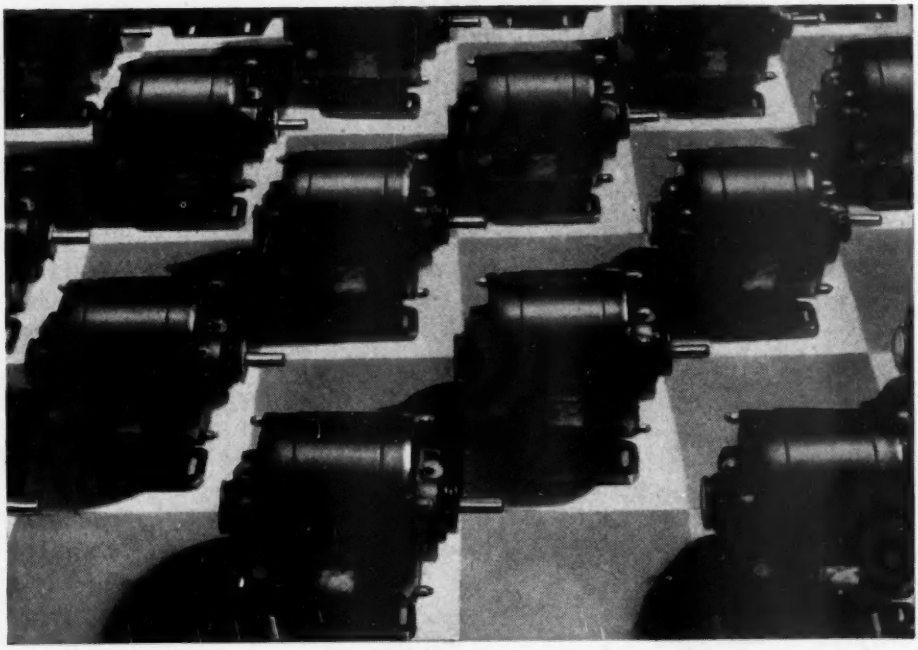

Metrovick fractional hp. motors

Britain's economic position demands the most efficient use of every unit of power—even that from the smallest fractional h.p. motor.

To gain maximum efficiency from the electric power used in your plant you cannot do better than specify motors by Metrovick. Made in sizes from 1/50 to 25,000 hp. and upwards.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER 17
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METROVICK *motors for every phase of industry.*

J/Q001

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

THE DIRECTOR-GENERAL

INDIA STORE DEPARTMENT, 32/44 Edgware Road, London W.2, invites tenders for the supply of alternatively:—

COMPOUNDED STEEL TAPE, or BRIGHT STEEL TAPE (Uncompounded) for Telephone Cable Factory, Chittaranjan, India.

Dimensions.	Tons.
1¼ in. x 0·040 in.	510
1 in. x 0·030 in.	125
½ in. x 0·020 in.	8

Forms of tender, which are returnable by Tuesday, December 23, 1952, may be purchased at the above address at a cost of 10s.

Reference S.2503/52 should be quoted in all applications. (B 523)

CITY OF MANCHESTER

THE WELFARE SERVICES COMMITTEE invite tenders for ELECTRICAL INSTALLATION required at "F" Home, "Newholme," Nell Lane, Manchester. Specification and drawings may be obtained from the City Architect, Town Hall. Deposit £1 1s. (returnable). Tenders, sealed in endorsed envelopes, must be delivered before 10 a.m., Monday, December 1, 1952.

PHILIP B. DINGLE,
Town Clerk.

November, 1952. (B 552)

COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE

TENDERS are invited for the complete RENEWAL of the electrical installation at the Elland Grammar School.

Specification with plans, together with conditions of tender may be obtained on application to the County Architect, "Bishopgarth," Westfield Road, Wakefield, on payment of a deposit of £2 2s. which will be returned on receipt of a bona-fide tender. Cheques must be made payable to the "West Riding Treasurer" and crossed "& Co."

Sealed tenders must be addressed to me, the undersigned and received at Room 3, County Hall, Wakefield, not later than 10 a.m. on Monday, December 1, 1952.

BERNARD KENYON,
Clerk of the County Council.

November, 1952. (B 527)

CITY OF MANCHESTER

THE ESTATES MANAGEMENT COMMITTEE invite tenders for ELECTRICAL INSTALLATIONS for Shops and Maisonettes at (a) Northern Moor North West Subcentre and (b) Sharston and Benchill South East Subcentre. Specifications and tender forms may be obtained from the City Architect, Town Hall. Deposit £1 1s. each (returnable). Tenders, sealed in endorsed envelopes, must be delivered before 10 a.m., November 24, 1952.

PHILIP B. DINGLE,
Town Clerk.

November 4, 1952. (B 553)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London Allowance, and conditions of service in accordance with N.J.B. Agreement.

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)

Barking "A" and "B" Generating Stations

Qualifications: considerable experience with the mechanical maintenance and overhauls of large turbo-alternators, P.F. and Chain Grate boilers, auxiliary plant, and the control of machine shops. Wide experience in the control of labour of all grades. Will be responsible, under the maintenance engineer (mechanical) for the efficient planning and completion of plant overhauls. Candidates should possess a Higher National Certificate or equivalent and, preferably, be a member of one of the recognised Institutions. Salary—Schedule "A," Class "M," Grade 8—£941 17s. per annum.

MAINTENANCE ENGINEER (MECHANICAL)

Acton Lane Generating Station

Candidates should have received a sound technical and practical training and should be fully conversant with up-to-date methods of planning, supervision and of plant records. Experience on turbine plant and auxiliaries together with ash and coal handling is essential, also a knowledge of the conciliation machinery. Salary—Schedule "A," Class "H," Grade 7—£784 7s. per annum.

STATION SHIFT CONTROL ENGINEER

Hackney Generating Station

Qualifications up to Higher National Certificate standard and practical experience with E.H.T. switchgear. Salary—Schedule "A," Class "F," Grade 10—£584 17s. per annum.

FIRST ASSISTANT STATION CHEMIST

Bankside "A" and "B" Generating Stations

Recognised qualification in chemistry gained by examination, with experience in the examination of liquid and solid fuels, water examinations and gas analysis. Position will entail laboratory supervision, and requires an interest in the chemistry of flue gas purification by water washing, and the chemical aspects of power generation. The stations operate at 275 lb/sq in. and 900 lb/sq in. pressure. Salary—Schedule "A," Class "H," Grade 9—£693 per annum.

GENERAL ASSISTANT ENGINEER

Thames Grid Control Area, London

Applicants should be technically trained up to Grad. I.E.E. standard. Previous power station experience an advantage. Successful candidate must be prepared to shift hours if required. Salary—in scale N.J.B. Schedule "C," Class "AX," Grade 8—£506 to £649 19s. rising to ultimate maximum EX.8—£728 14s. per annum.

Applications must be made on the form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland Street, W.1, and be returned within 14 days of this advertisement. (B 539)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following position:

S/13.319/2 ENGINEERING DRAUGHTSMAN (Mechanical)
Divisional H.Q.

Applicants should have had experience of work concerning turbines and auxiliaries, boilers and auxiliaries, coal and ash handling plant and pipework.

Salary N.J.B. Schedule "D," Grade 6, £413 to £547.

Application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111 High Street, Portsmouth, must be returned by November 26, 1952. (B 544)

KENT COUNTY COUNCIL

APPLICATIONS are invited for appointment in the Buildings Department of an ENGINEERING ASSISTANT (Electrical) in A.P.T. Grades I-III (£465-£570).

Applicants must be capable draughtsmen with practical experience in electrical installation work and should preferably be graduate members of the Institution of Electrical Engineers.

Applications, on forms obtainable from the County Architect, Springfield, Maidstone, must be delivered to him within fourteen days of the appearance of this advertisement.

W. L. PLATTS,
Clerk of the County Council.

County Hall,
Maidstone.
November 4, 1952. (B 528)

GOVERNMENT OF KUWAIT

QUALIFIED REFRIGERATION AND AIR-CONDITIONING ENGINEER required for the Government of Kuwait, Persian Gulf. Applicants to be men who have specialised in refrigeration and air-conditioning work, and have good knowledge of cold storage installations. They must also have had at least five years' experience in the design and operation of air-conditioning of large buildings and houses in countries where hot and dusty climatic conditions prevail. The engineer will be required to organise and operate a refrigeration and air-conditioning department, and will be responsible for design, installation, operation, maintenance of refrigeration and air-conditioning schemes including the servicing of existing room coolers, both British and American. The consolidated salary will be from £2,000 to £2,500 per annum, depending on qualifications and experience. Free furnished accommodation, when available, will be provided, also medical attention and air passage out and home.—Applications, stating age and giving full particulars of technical qualifications practical training and subsequent experience, should be addressed in the first instance to the Secretary, Ewbank and Partners Limited, 10-11 Grosvenor Place, London S.W.1. (B 461)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

APPLICATIONS are invited for the position of ASSISTANT ENGINEERS (MECHANICAL OR ELECTRICAL PLANNING) at Brighton 'B' Power Station.

Applicants, who should possess sound technical knowledge and be familiar with the operation of H.P. Plant, will be responsible for the planning of mechanical or electrical plant maintenance and associated labour.

Salary: Class "J," Grade 11—£619 per annum.

Arrangements have been made with the local Council whereby accommodation is available for successful applicants who are at present living in rented property.

Applications on forms obtainable from Station Superintendent, Brighton Power Station, Portslade-by-Sea, Sussex, to be received by him not later than November 28, 1952. (B 524)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

GENERAL ASSISTANT ENGINEER—PROTECTION

A GENERAL ASSISTANT ENGINEER is required in the Protection Section of the Technical Department at the Divisional Headquarters, 168 Broomhill Drive, Glasgow, W.1. The salary will be within the range £461 to £655 and the post is superannuable. Applicants should possess the Higher National Certificate in electrical engineering or the equivalent and should have had some experience in protective gear.

Applications on Form AE6, which may be obtained from the Authority's Headquarters or from any Divisional Office of the Authority, should be forwarded to the Divisional Secretary at the above address within 14 days.

A. CHRISTIANSON,
Divisional Secretary.

November 3, 1952. (B 530)

MIDLANDS ELECTRICITY BOARD

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER required in the Contracting Section at Gloucester District of the Central Gloucestershire Sub-Area. Duties involve preparation of specifications and estimates, planning the work and supervision of contracting section. Experience necessary in electrical contracting, including installation, maintenance and consumer service. Technical qualifications desirable. Salary £504 to £521 per annum (N.J.B., Class "E," Grade 11), superannuable.

Apply within 14 days, stating age, experience, salary and position to Mr. D. Holt, Sub-Area Manager, Midlands Electricity Board, 126 London Road, Gloucester.

A. STEPHENS,
Secretary.
(B 543)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

Littlebrook Power Station

ASSISTANT CHARGE ENGINEER. Technical qualifications equivalent to graduate membership of either the Institution of Mechanical or Electrical Engineers. Responsible experience of the operation of modern H.P. power station plant and good knowledge of efficient operation of boiler and turbine plant essential. P.F. experience advantageous. N.J.B. conditions of service, Class "J," Grade 9, £733 19s. including London Allowance. Applications on forms obtainable from Station Superintendent, Littlebrook Power Station, near Dartford, Kent, to be received by him not later than November 25, 1952. (B 541)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

SECOND ASSISTANT ENGINEER (CIVIL)

APPLICATIONS are invited for the position of Second Assistant Engineer (Civil) in the Transmission (Construction) Department at Divisional Headquarters, Glasgow. The salary will be within the range £809/£1,000 and the post is superannuable.

Applicants should be Corporate Members of the Institution of Civil Engineers or hold equivalent qualifications. They should have experience in the design and construction of buildings, reinforced concrete structures, and high voltage transmission lines.

Applications on Form A.E.6, which may be obtained from the Authority's Headquarters, or from any Divisional Office of the Authority, should be forwarded to the Divisional Secretary, 168 Broomhill Drive, Glasgow, W.1, before November 25, 1952. (B 517)

GOVERNMENT OF KUWAIT

QUALIFIED ELECTRICAL AND MECHANICAL ENGINEER required for service with the Government of Kuwait, Persian Gulf, to act as personal assistant to the Chief Electrical and Mechanical Engineer to the Government. The applicant should have good experience of electrical distribution and administration of an electrical department and be capable of making sound decisions on his own account for submission to the development department of the Government of Kuwait. The consolidated salary will be from £2,000 to £2,500 per annum, depending on qualifications and experience. Free furnished accommodation, when available, will be provided also medical attention and air passage out and home. —Applications, stating age and giving full particulars of technical qualifications, practical training and subsequent experience, should be addressed in the first instance to the Secretary, Ewbank and Partners, Limited, 10-11 Grosvenor Place, London S.W.1. (B 460)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the superannuable appointment of THIRD ASSISTANT ENGINEER in the Generation (Ops) Dept. at this Headquarters. Salary N.J.B. AX/CX 5 (£629-£810 p.a.). Candidates should have obtained H.N.C. Duties will include system operation liaison between Division, Grid Area Control and Area Board, necessitating knowledge of control of inter-connected power systems and operation and performance of Power Station plants.

Application forms, obtainable from Div. Secretary, British Electricity Authority, South Wales Division, Cardiff (Pengam Moors) Airport, Cardiff, should be returned by November 25, 1952.

November 4, 1952. (B 525)

LONDON ELECTRICITY BOARD

ENGINEER (TEST)

APPLICATIONS are invited for the above position in the Meter and Testing Branch of the Southern Sub-Area at present located at Beckenham, Kent, but the successful candidate must be prepared to work anywhere within the Sub-Area.

Applicants should have a sound technical education and preferably have obtained the Higher National certificate in electrical engineering or equivalent qualification, and possess practical experience in general distribution work and a specialised knowledge on the testing of protective equipment, high voltage cables, switchgear and transformers, and be able to carry out cable fault location and general testing work on the high voltage systems.

The post is graded under Schedule "A" of the National Joint Board agreement as Class "K," Grade 10—£773 19s. per annum, rising to £764 8s. per annum, inclusive of London Allowance.

Application forms, obtainable from Establishments Officer, 46 New Broad St., E.C.2, to be returned completed by November 24, 1952. Please enclose addressed envelope and quote ref.: V/1519/T. on all correspondence. (B 538)

NORTH EASTERN ELECTRICITY BOARD

CLERK OF WORKS required to supervise construction and maintenance of buildings and general civil engineering works in the Wear Sub-Area.

Salary within the range £596 to £625 in accordance with that payable to General Assistant Engineers, Class "L," Grade 13, under National Joint Board Agreement for Electricity Supply Industry.

The successful applicant will be required to reside in or near Sunderland. Applications, giving full details of age, training and experience, should be forwarded to, The Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne, 1 not later than November 22, 1952. (B 536)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, SENIOR ASSISTANT ENGINEER in the Substations Section of the Western Sub-Area of the Board at Tenby.

Candidates should have had a sound engineering training and extensive experience of substation design and construction and the operation and maintenance of all classes of switchgear up to and including 33kV.

Salary in accordance with Class "G," Grade 4 (£880 to £900 to £919) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary to arrive by November 29, 1952.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (B 537)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the superannuable appointment of MAINTENANCE ENGINEER (Elec.) at the Uskmouth Power Station, Nr. Newport. Salary N.J.B. K6 (£911 to £952 per annum). Classification will eventually be "L." Candidates should preferably be Corporate Members of the I.E.E. and should have had wide experience in power station electrical maintenance.

Application forms obtainable from Div. Secretary, British Electricity Authority, South Wales Division, Cardiff (Pengam Moors) Airport, Cardiff, should be returned by November 26, 1952.

November 5, 1952. (B 540)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

SHIFT CHARGE ENGINEER
Yoker Generating Station

A SHIFT CHARGE ENGINEER is required at Yoker Generating Station for which the salary will be within the range £677 to £696, this being in Class "F," Grade 7 of the National Joint Board schedule.

Applications on Form AE6 which may be obtained from the Authority's Headquarters or from any Divisional Office of the Authority should be forwarded to the Divisional Secretary, 168 Broomhill Drive, Glasgow, W.1, within 14 days. (B 529)

NORTH WESTERN GAS BOARD

Manchester Group

ELECTRICAL SUPERINTENDENT
Partington Works, Manchester

APPLICATIONS are invited for the above pensionable appointment at a salary within Grade A.P.T. 12 (£720 to £845 per annum).

Applicants should be preferably Corporate Members of the Institution of Electrical Engineers or have passed Sections A and B or be exempt therefrom. They should have experience in the operation and maintenance of 2,500 kW, 6·6 kV alternators, 6·6 kV and 440 V distribution systems, electric motors and starters up to 500 h.p. at 6·6 kV, and the organisation of routine electrical maintenance on large gasworks and coke oven plants.

Detailed applications, giving the names of two referees, should reach the General Manager, North Western Gas Board (Manchester Group), Town Hall, Manchester 2, within 14 days. (B 561)

LANCASHIRE COUNTY COUNCIL

ELECTRICAL ENGINEER required. Salary £595-£645. Experience necessary in design and maintenance of electrical installations particularly in existing buildings. Preference to holders of H.N.C. in Electrical Engineering or equivalent.

Application forms from County Architect, County Hall, Preston, returnable by November 22, 1952. (B 516)

COUNTY BOROUGH OF DONCASTER

Works Department

APPLICATIONS are invited for the position of ELECTRICAL ASSISTANT in the above Department at a salary in accordance with Grade A.P.T. 5 (a) of the National Scales of Salaries (£625 rising to £685).

Candidates must have had practical experience of domestic and industrial installation work and be capable of preparing estimates and specifications and supervising the carrying out of electrical installations and maintenance work in municipal buildings, works, schools and new housing schemes.

Candidates should also have had experience of street lighting work, and will be responsible, under the Borough Surveyor, for works of installation and maintenance of street lighting, both electricity and gas.

Education standard should be equivalent to matriculation and applicants should possess the Higher National Certificate in Electrical Engineering.

Written applications, stating age, education, qualifications and full details of experience, accompanied by copies of two recent testimonials and disclosing in their application whether to their knowledge they are related to any member of, or the holder of any senior office of, the Council, should reach the undersigned not later than December 6, 1952.

H. R. WORMALD,
Town Clerk.

Town Clerk's Office,
1 Priory Place,
Doncaster.
November 10, 1952. (B 562)

ASSISTANT ENGINEERS experienced in the survey and construction of overhead transmission lines in Scotland, mainly wood pole types.—Details of age, education, experience and salary to Box No. 850, Keith and Co., Advertising Agents, Edinburgh. (B 526)

BRITISH ELECTRICITY AUTHORITY. The following vacancies occur in the Drawing Office at Bankside, London:—

SENIOR DRAUGHTSMEN, aged 26 and over (Grades 4 and 5), and DRAUGHTSMEN (Grade 6) experienced in layout of Power Stations or ancillary equipment. SENIOR DRAUGHTSMEN, aged 26 and over (Grade 5), and DRAUGHTSMEN (Grade 6), experienced in R.C. design and detail for light structures and foundations for outdoor substations. DRAUGHTSMEN (Grade 6), experienced in layout or electrical diagrams for outdoor substations.

Salaries N.J.B. Grade 4, £684-£793; Grade 5, £574-£684; Grade 6, £438-£574 inclusive. Pension Scheme. One Saturday in four on duty.

Application forms from D. Moffat, Director of Establishments, British Electricity House, Winsley Street, London W.1. Quote reference ET/AE 295. (B 518)

C.M.A. Cable Manufacturers require experienced REPRESENTATIVES for the sale of rubber cables in the London area. Must have good technical knowledge as well as sales experience.—Please reply, in confidence, giving full details, to Box No. 2193, Electrical Times. (B 556)

DISTRIBUTION ENGINEER required for service in the British West Indies.

Applicants should not be less than 35 years of age should have had a public school education and must be corporate members of the Institution of Electrical Engineers.

Applicants must have at least ten years experience in overhead and underground distribution systems up to 11 kV, and must be capable of administering a supply system, including consumer agreements and tariff settlements.

The post will carry a salary (including bonus) of £1,500 per annum, and furnished quarters will be provided and the company will pay for air or sea passage for the selected candidate.

Three months leave, on full pay, together with passage to this country, will be granted on completion of each three years of service.

Applications, giving full particulars of education, training and experience to Box No. 2171, Electrical Times. (B 480)

ELECTRICAL DRAUGHTSMAN required, with some estimating experience, on constructing and factory maintenance. Apply, Employment Manager, Vickers-Armstrongs Limited (Aircraft Section), Weybridge, Surrey.—Applications, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service. (B 545)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

ELECTRICAL ENGINEER, H.N.C. standard for development work in laboratory in West Middx. Able to extract and collect technical data and supply technical information to Sales Dept. Training will be given.—Details age, experience, etc. to Box No. 2185, Electrical Times. (B 532)

EWBANK AND PARTNERS LIMITED have vacancies for the following:—
MECHANICAL ENGINEERING DRAUGHTSMEN experienced in Power Station design and layout, pipework layout, circulating water systems, with a knowledge of coal and ash handling plants.
ELECTRICAL ENGINEERING DRAUGHTSMEN experienced in Power Station and substation distribution systems.
The positions are permanent and are pensionable. Free lunches are provided and a five-day week is in operation.—Applicants should write in the first instance, stating age, details of experience and salary required, to The Secretary, Ewbank and Partners, Limited, Engineering Consultants, 10/11 Grosvenor Place, London S.W.1. (B 519)

JOHN BRUCE AND PARTNERS, Engineering Consultants, invite applications from MECHANICAL and ELECTRICAL ENGINEERING ASSISTANTS. Applicants should have had experience in the design, layout and site supervision of erection of large high-pressure steam generating installations, large turbo-alternator installations and associated coal and ash handling plant, e.h.t., h.t. and l.t. switchgear and boiler and turbine auxiliary machinery, the design, layout and site supervision of erection of large pipework installations up to the highest pressure and temperature conditions in use today; the design, layout and site supervision of erection of large industrial steam generating and steam utilising installations, including electrical generation by back pressure or pass-out turbo-generators; the design, layout, and site supervision of erection of heating installations for industrial purposes by steam in conjunction with industrial process steam systems or back pressure or pass-out turbines. Applicants must have served a recognised apprenticeship, be prepared to work hard and prepared to work on a drawing board or put on a boiler suit as necessary. The firm does not operate a five-day week and applicants must be prepared to work or travel in the evenings, Saturday afternoon or Sunday if the urgency of work demands it. Location of work, in the first instance, is in London, either on office duties or on site of works, as required. Good salaries will be offered to applicants with the required qualifications. —Applications, in the first instance, should be addressed to Box No. 2141, Electrical Times. (B 437)

LIGHTING ENGINEER or PHYSICIST required for initiating and undertaking Staff Training Scheme for leading lighting manufacturing company. Thorough knowledge of lighting fittings essential, teaching experience an advantage. Every encouragement will be given to expand the functions by lecturing outside the organisation and establish a professional reputation for the successful candidate.—Applications in confidence with full details of past experience and salary required to Box A.300 c/o Central News, Ltd., 17 Moorgate, London, E.C.2. (B 533)

MECHANICAL MAINTENANCE ENGINEER wanted for large industrial power plant equipped with h.p. water-tube boilers, turbines and modern auxiliaries. Applicants must have some years practical experience with this type of power plant backed up with technical knowledge up to H.N.C. standard or its equivalent. Age not less than 32 or more than 45. Non-contributory pension scheme. Commencing salary £840. Position offers good prospects for a suitable man.—Reply to Box No. 2183, Electrical Times. Quote Ref. TME/3. (B 531)

THE GENERAL ELECTRIC COMPANY LIMITED
WITTON, BIRMINGHAM

requires Winders for turbo-alternators and large a.c. and d.c. machines. High-level earnings and good shop conditions; pension scheme. Housing assistance will be given in approved cases. Apply by letter, giving full details of experience, to:—

The Labour Manager,
THE GENERAL ELECTRIC COMPANY LIMITED
Electric Avenue, Witton, Birmingham 6 (B 555p)

POWER STATION
SHIFT CONTROL ENGINEERS

wanted for the Margam Works of the Steel Company of Wales Limited. Applicants must have advanced technical education, and experience in the control of an interconnected boiler or turbine operation would be an advantage.

The salary for this position, which is pensionable, is according to age and experience.

Applications in own handwriting should be addressed to:

The Personnel Superintendent
THE STEEL COMPANY OF WALES LTD.
P.O. Box No. 3, PORT TALBOT

and be received not later than November 24, 1952. (B 547p)

MANAGER for London Branch of National E.W.F. Wholesaler, with experience and drive to develop large turnover. Previous experience in a similar capacity essential. Salary, commission, expenses, pension. —Box No. 2143, Electrical Times. (B 438)

SALES ENGINEERS required by Ventilating Engineers and Fan Manufacturers in territories covering London, West of England and South Wales, Yorkshire and West Midlands and the North of England. Young vigorous company. Excellent opportunities for determined men not afraid of hard work.—Write full particulars Box No. 2195, Electrical Times. (B 557)

SENIOR TEST ENGINEER and ASST. TEST ENGINEER required for the E.D.A. Testing House at Leatherhead. Candidates for the senior post, salary £600 to £700 per annum, should have the Higher National Certificate in Electrical Engineering or similar qualification and wide experience in the design and testing of electrical domestic apparatus. For the junior post, salary £400 to £500 per annum, correspondingly lower standards would be acceptable.—Applications, stating age, details of qualifications and experience, should be addressed, not later than December 15, to the General Manager and Secretary, British Electrical Development Association, 2 Savoy Hill, London W.C.2. (B 542)

STOREKEEPER for West End electrical contractors; able to check and keep stock.—Write Box No. 2153, Electrical Times. (B 453)

THE GENERAL ELECTRIC CO. has a vacancy on the staff of their organisation in India for a CONTRACTS ENGINEER. The duties will involve both the preparation of specifications and estimates for electrical installations of all types, including factories, offices, hotels, cinemas, street lighting, etc., and the supervision of the installation work. This is a permanent and pensionable position of a responsible nature, carrying a good starting salary. There are excellent opportunities for advancement.—Applicants, who should not be more than 35 years of age, should state whether they are married or single and forward full particulars of their education, training and experience to the Staff Manager, Magnet House, Kingsway, London, W.C.2. (B 546)

APPOINTMENTS WANTED

CABLE and Wire Manufacture. Branch Manager, South Wales and West England territory (32), requires situation. Sales representation/clerical experience. Electrical knowledge. Current licensed driver. Six years cable industry.—Box No. 2181, Electrical Times. (B 520)

ELECTRICAL ENGINEER (27), A.R.T.C.S., H.N.C., heavy and electronics, seeks technical representative. Experience contracting, maintenance and commercial.—Box No. 2129, Electrical Times. (B 392)

WANTED

A.C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 11)

MOTORS. Wanted to purchase D.C. Motors and Generators as fitted to Coles Cranes. Incomplete machines considered.—Box No. 2189, Electrical Times. (B 551)

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types. Steel Balls and Rollers. Top prices paid. Purchases from Traders only.

CLAUDE RYE BEARINGS

895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (B 254p)

WANTED. D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 7)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED, Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath, Staffs. (A 3)

WANTED, ROTARY CONVERTORS, any size. Universal, 221 City Road, London E.C.1. (A 9)

WORK WANTED

A.C. and d.c. MOTOR REWINDS and REPAIRS. Prompt service, fully guaranteed. Edgware 5566 (4 lines). —Service Electric Co., Ltd., Stanmore, Middx. (A 19)

BRASS LIGHTING FITTINGS cleaned and gilded. Crystal chandeliers repaired and cleaned. Outside lanterns gilded and waterproofed.—Arts and Antiques, 49 Berwick Street, London W.1. (B 393)

CASTINGS. Fisher Foundries Ltd., Greet, Birmingham, have capacity for brass, gunmetal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (A 647)

MOTOR GENERATOR SETS built to customers' requirements from new and/or modern reconditioned machines. Guaranteed for twelve months. Good deliveries, competitive prices.—Enquiries to Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (Ext. 347). (B 402)

AGENCIES

FLUORESCENT TUBE refilling specialists require AGENTS in all areas excepting London and Lancs. Must have facilities for the storing and distribution of tubes.—Qualpron (Elect.), 43-45 Crawford Street, Glasgow W.1. (B 506)

MANUFACTURERS' AGENTS ASSOCIATION INC. (E.T.), 8 Bream's Buildings, London W.C.2, supplies free lists of Agents to Manufacturers seeking representation in important industrial centres. Membership available to established agents only. Particulars supplied. (A 4)

FACTORIES FOR SALE

Exceptional Opportunity to acquire

MODERN NORTH LIGHT FACTORY

in Midlands (est. 1920), approx. 10,000 sq ft fully equipped for the manufacture of a wide range of Electrical Apparatus for Industrial, Catering and Domestic purposes. Good office accommodation, central heating, ladies' and gent's toilets. Drive-in entrance with ample land for extension. Offers invited for freehold land and factory, or complete as going concern.—Box No. 2197, Electrical Times. (B 560p)

FOR SALE

AUCTIONS

By order of David Morgan, Esq., F.S.A.A., Liquidator re Knight's (Hendon) Ltd. & ors. In Vol. Liquidation.

ELECTRICAL CONTRACTORS' AND RETAILERS' STOCK AND PLANT

Aerograph 220 and Bristol elec. Spray Plants, Invicta I.X.L. 5 in. s.s. and s.c. Lathe. Crompton Parkinson Convertor 440/50/3 to 50 V 105 A d.c. Taylor a/w Signal Generator, Avometer, Test Meters, Legg 24/10 Charger, B.O.C. Welding Plant, Goliath Shears, Besco 24 in. Folder and Bender, Tube Benders, Adjustable Die stocks from 2½ in., Drills, Grinder.

A 1947 AUSTIN 10-CWT. VAN.

Tannoy and G.E.C. P.A. Equipment.

CONDUIT FITTINGS, switch and fuse gear, lamps, fluorescent lights, elements, accessories, 1 h.p. motors. APPLIANCES, Clothes Dryers, Refrigerator, Cookers, Irons, Toasters, Clocks, Hedge-cutter.

OFFICE FURNITURE and Shop Fittings, steel Filing Cabinets and Cupboards, Royal Typewriter, 2 Safes, Desks, etc.

To be Sold by Auction at rear of 42 Watford Way, Hendon Central, London N.W.4, by

HAROLD ANNISON

on Wednesday, November 19, at 11 o'clock.

Auction Office: 44 Pembury Road, Tonbridge, Kent. 'Phone 2016. (B 521)

E R

By order of the Secretary of State for Air.

AUCTION SALE

For No. 14 M.U., R.A.F., CARLISLE

No. 7 Site, Blackwood, Longtown, 9 miles north of Carlisle.

THURSDAY, NOVEMBER 27, 1952, at 11 a.m.

Sale held in the COUNTY HALL, CARLISLE (top of Botchergate).

ELECTRICAL AND INDUSTRIAL MACHINERY AND SUNDRIES including Generators, Alternators, Motors, Rotary Convertors, Panels, Receivers, Armatures, Switches, Test Sets, Pumps, Fuel Tanks, Brake Drums, Engine and Vehicle Spares, Projectors, Compasses, Binoculars, Sundries.

Viewing Wednesday, November 26, 9 a.m. to noon and 1 to 4.30 p.m., and on sale morning to 11 a.m.

Catalogue (6d.) admits two to viewing, one only to sale.

Auctioneers:

HARRISON & HETHERINGTON LTD.

CARLISLE

Tels. 1792/3. Telegrams: "Sales." (B 558)

CABLES & WIRE

TINNED STEEL ARMATURE BINDING WIRE. All sizes from 14 s.w.g. to 30 s.w.g. supplied in coil or on reels.—Frederick Smith and Co., Wire Manufacturers, Ltd., Caledonia Works, Halifax. (B 77)

DOMESTIC APPLIANCES

GRUBB IMMERSION HEATERS. The new 7 kW model. No purchase tax. Provision for intermediate loadings as required. All lengths 16 in. to 30 in. Immediate delivery.—Write for particulars and terms to distributors, John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2639. (B 25)

ENGINEERING PLANT & MATERIALS

A. AND K. PLASTIC MOULDING PRESS for sale, hand operation, steel plate frame. Elect. heated tools, max. stroke 5½ in, centre to back 8½ in, die space, ram down 9½ in, hand ejector, weight 9 cwts. Photo, etc.—F. J. Edwards Ltd., 359 Euston Road, London. (B 559)

COLES THORNYCROFT CRANE, Mark VII. Series 7. Little used.—Box No. 2165, Electrical Times. (B 473)

PROJECTION WELDING MACHINE made by Sciaky, 100 kVA, 3-phase, 400 V, 50 cycle. Type P.M.I.P. This machine is new. Reason for selling, cancellation of contract.—F. C. Hewlett, W.S. Manufacturing Co., Ltd., 28 Sheepcote Street, Birmingham 15. (B 509)

GENERATING PLANT

DIESEL ALTERNATOR SETS in stock up to 500 kVA, 400/440 V, 3-phase, 50 c/s, 4-wire. Detailed stock list post free on request.—Thos. W. Ward, Ltd., Albion Works Sheffield. Tel.: 26311 (Ext. 347). (B 403)

FOR SALE. The City Council of Gibraltar have for sale two MOTOR-ALTERNATOR-EXCITER SETS of 69 kVA and 25 kVA outputs each directly-coupled on common bedplate 440 V d.c., 400/440 V, 3-phase, 4 wire, 50 cycles a.c. fitted with motor-driven "Isenthal" automatic voltage regulator cubicle-type switchboards with 3-pole O.C.B. and fully-protected ironclad enclosed d.c. starter. Both sets in excellent working order. Offers are invited for the sets packed ready for despatch from Gibraltar.—Further particulars on application to the Crown Agent for the Colonies, 4 Millbank, London S.W.1 (Reference O/Prod. 1519). (B 548)

GENERATING PLANT for sale.—One 500 kW B.T.H. ROTARY-CONVERTOR, 11 kV, 450-490 V, 1,069 amps d.c. Complete with the following equipment:

One h.t. 11 kV O.C.B., G.E.C. One 500 kW, B.E.T. TRANSFORMER. One Rotary STARTING PANEL.

One d.c. PANEL comprising of D.P., A.C.B., 1,200 amps, Field Rheostat, Ammeter, Voltmeter and K.W.H. Meter, the d.c. equipment is mounted on polished black slate.

This machine is in perfect working order and can be inspected under full running conditions, by appointment at Backhouse and Coppock, Ltd., Sutton Mills, Macclesfield. (B 534)

1 CROMPTON Parkinson dynamo, 6 kW, 725 r.p.m., 50/75 volts, 80 amps., continuous rating, shunt wound, complete with pulley and slide rails. In good working order. —Inspection at Thos. Crump & Co. Ltd., Friar Gate, Derby (B 522)

LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80 W Tapped h.p.f. ballast, with starter switchgear-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each, subject.—F. W. Blanshard Ltd. (Dept. ET), Purley, Surrey. Uplands 4818-9. (A 20)

METERS

A.C./D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gardens, London, N.W.4. (A8)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London, E.C.1. (A 14)

MOTORS & STARTERS

A. A. ELECTRICAL CO. FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Chiswick 5605, 67 Rothschild Road, W.4. (A 10)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2278-9.) (A 5)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566/9. (A 13)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7322. (A 6)

A.C. MOTORS, BRAND NEW. Delivery from stock. Fractional to 200 h.p., 600, 750, 1,000 and 1,500 r.p.m. 400/440 V, 3-phase, 50 c/s, with or without control gear. Also numerous reconditioned a.c. and d.c. motors and other electrical plant. Detailed price stock list post free on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (Ext. 347). (B 404)

E.C. 400 volts, 3- phase, 50 cycles, slip ring INDUCTION MOTOR, with George Ellison control gear. 135 h.p., 580 r.p.m. B.T.H. 400 volts, 3-phase, 50 cycles, variable speed COMMUTATOR MOTOR, 15/5 h.p., 1,500/500 r.p.m.—Box No. 2147, Electrical Times. (B 441)

ELECTRIC MOTORS, 1,000 in stock up to 225 h.p.; huge quantities, all sizes switchgear up to 200 amps. P.I. and T.R.S. cables up to 0·2 sq in.—J. S. Ramsbottom and Co., Keighley, Yorks. (B 564)

FOR ELECTRICAL MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (A 16)

FOR Sale, quantity unused MOTORS, 3 h.p., 400/440 V, 950 r.p.m., squirrel cage, also starters and switches. Surplus to requirements.—Douglas Fraser and Sons, Ltd., Westburn Works, Arbroath. (B 514)

FOR SALE. Various a.c. and d.c. MOTORS, new and reconditioned secondhand, surplus to our requirements. These include ten 20 h.p. 6 pole a.c. S.C.R. motors new; five 7½ h.p. ditto: twelve 2-speed change pole a.c. motors 5/2½ h.p. 4/8 pole, also new, all wound for 400/440 V 3 phase 50 cycles and offered at attractive prices. —Full details on application, The Newall Engineering Co., Ltd., Old Fletton, Peterborough. (B 549)

MOTORS, fractional. All types, all sizes, including flame-proof and geared, speeds 1 r.p. week to 2,000 r.p.m.—Jeary Electrical Co., Ltd., 324 Old Street, E.C.1 (Tel.: Sho 7511). (B 79)

All types and sizes of

Industrial Electrical Equipment

ELECTROPOWER COMPANY LIMITED

Kingsbury Works, Kingsbury Road, London, N.W.9
Telephone: COLindale 4621/2. (A 18p)

ELECTRIC MOTORS for 400 V, 3-phase, 50 c/s. 300-h.p. auto synchronous L.D.M. MOTOR, open protected type on C.I. underbed, 600 r.p.m., with direct coupled exciter and Brookhirst control equipment.

225-h.p. S.R. MOTOR by B.T.H., 485 r.p.m., 292 amps. Protected type, 2 endshield R.O.B.

175-h.p. external S.R. MOTOR by B.T.H., 480 r.p.m. Protected type, 2 endshield R.O.B. Standard shaft ext.

150-h.p. 350-kVA synchronous induction MOTOR by Mather & Platt, 506 amps. 0·39 p.f., speed 750 r.p.m. With Brookhirst starter.

Two 120-h.p. external S.R. MOTORS by Met-Vick., 585 r.p.m. Screen protected type fitted drip proof cowls. Endshield B.R.B. Standard shaft ext. 8 in. by 4 in. dia.

100-h.p. external slipring MOTOR by Northumbria Motors. Protected type. Speed 485 r.p.m. With Ellison control gear. Extension fitted "V" rope pulley 22½ in. dia. by 10 in. for six 1½ in. ropes.

100-h.p. S.R. MOTOR by G.E.C., speed 725 r.p.m. Encl. ventilated, 2 endshield R.O.B. With Ellison starter.

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Three 95-h.p. Metro-Vick, slipring, totally encl. fan-cooled type. Shaft ext. 6 in. by 3 in. dia. Continuously rated.

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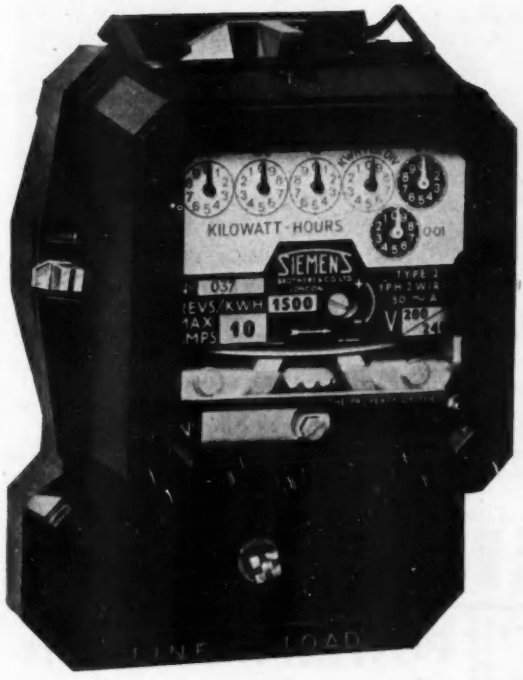

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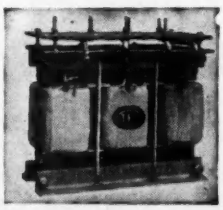

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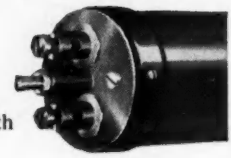

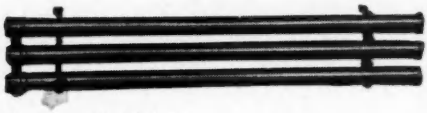

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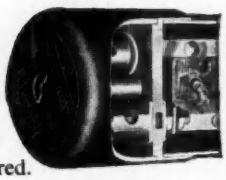

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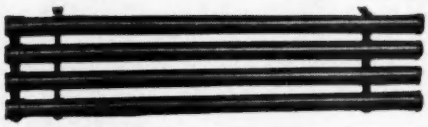

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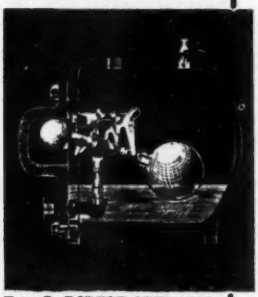

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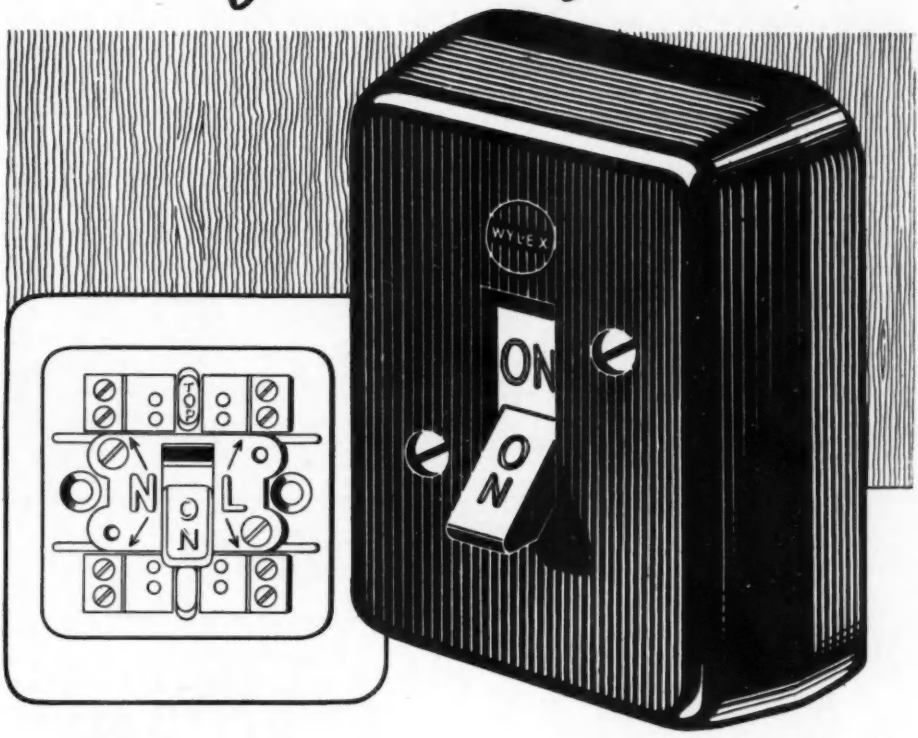

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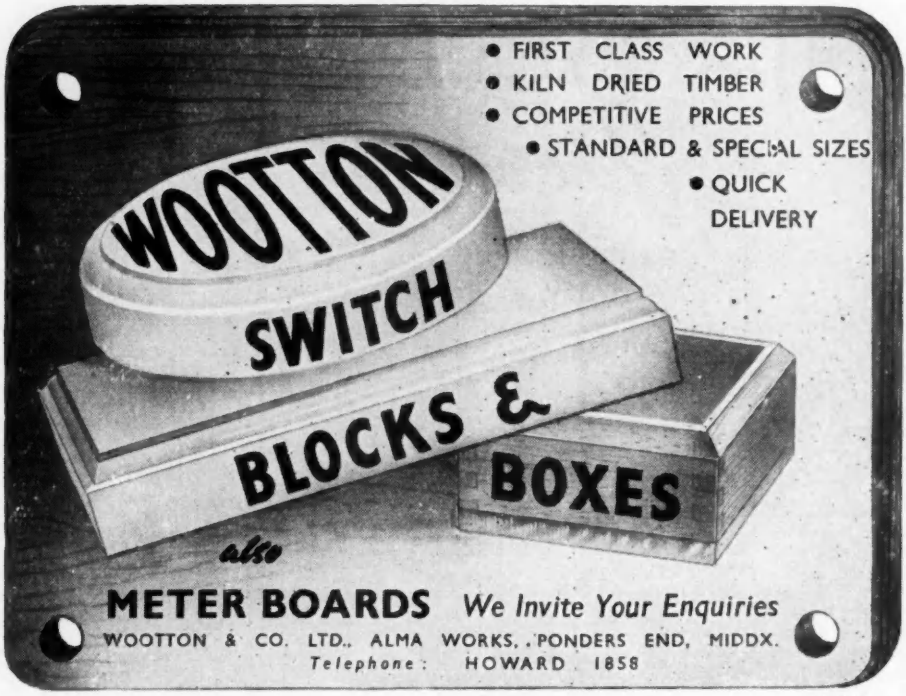

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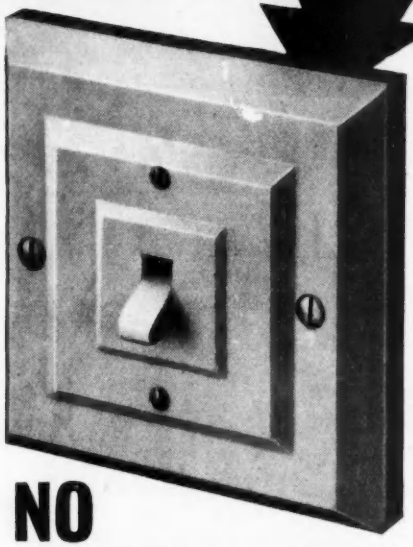

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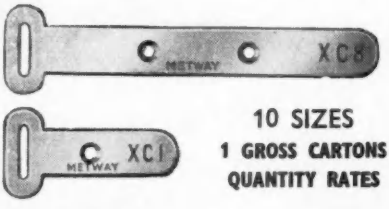

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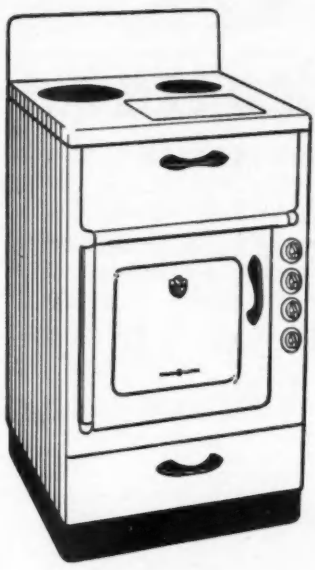

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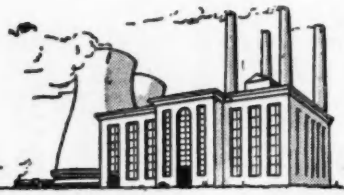

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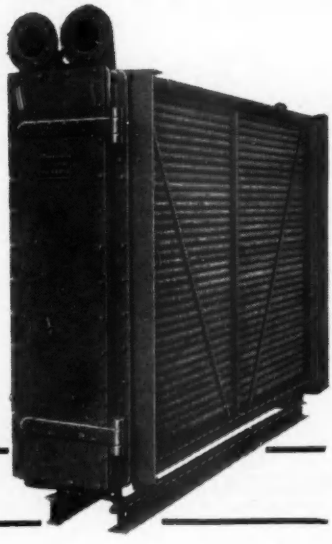

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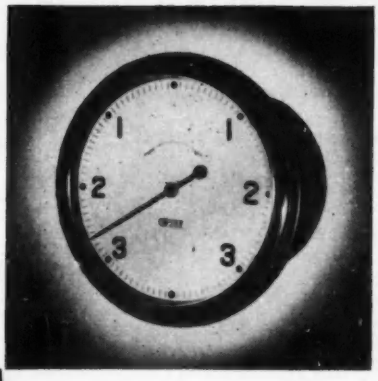

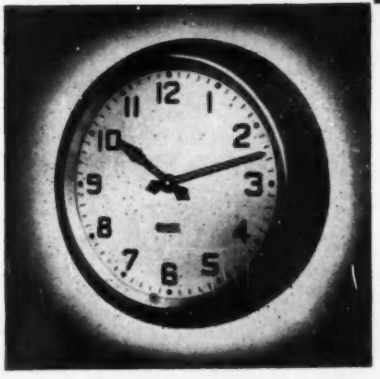

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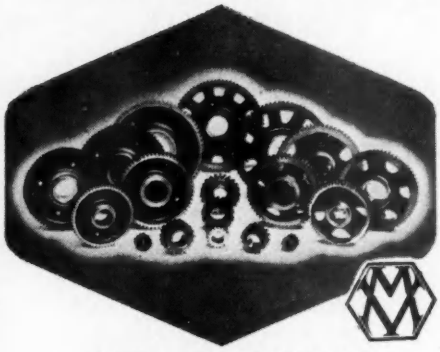

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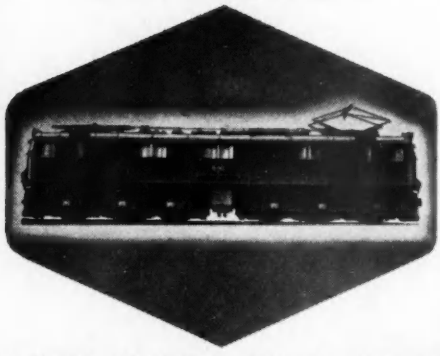

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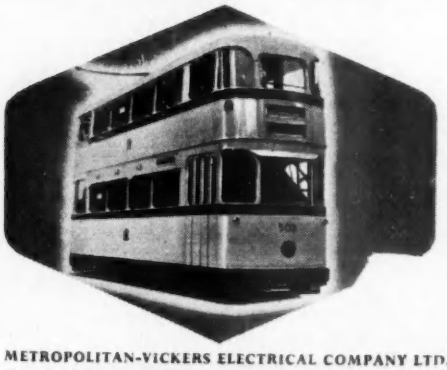

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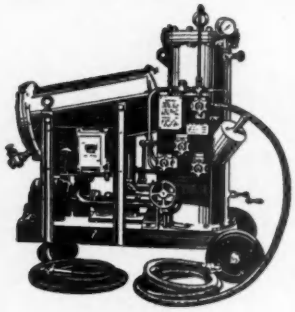

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30 mW, 22kV, 50 cycle frequency changer in course of construction showing Permali Grade EH67 End Winding support brackets and rings. Photo by courtesy of The English Electric Co. Limited.

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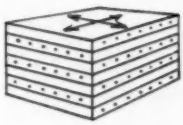

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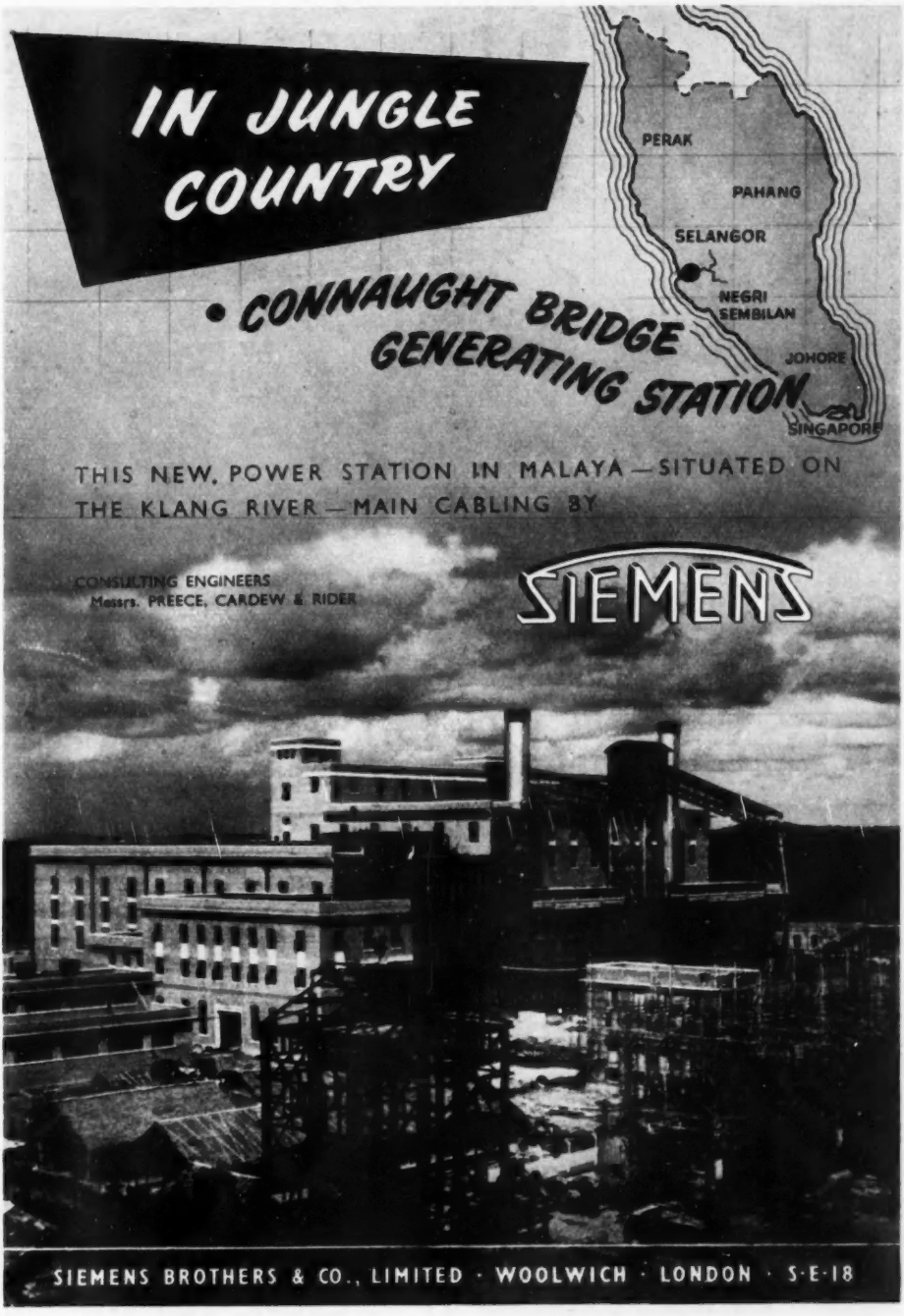
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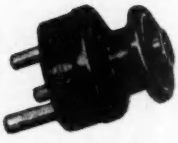

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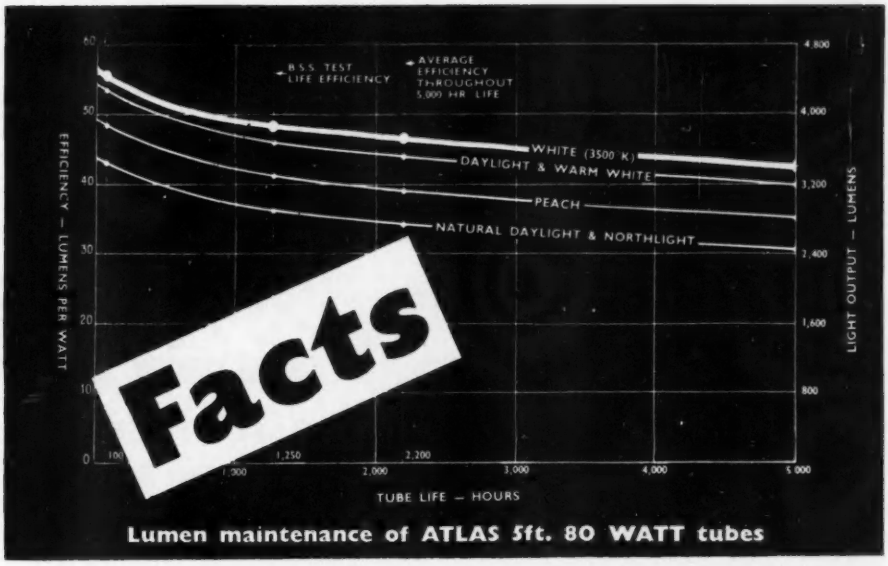

Lumen maintenance of ATLAS 5ft. 80 WATT tubes

This graph proves more clearly than any words that ATLAS 'double life' fluorescent tubes *do maintain* their brilliance. The curve and the figures given below are based on the performance of many thousands of 'double life' tubes checked for lumen maintenance in *actual service* as well as in Thorn Laboratories. This 'lumen maintenance' is shown below as the light output at 5,000 hours, expressed as a percentage of that at 100 hours.

The figures quoted are extracted from the ATLAS folder AL/115 — you should have a copy.

	80 w. tubes	40 w. tubes	30 w. tubes	2' 40 w. tubes	20 w. tubes	15 w. tubes
White	76.4%	81%	76.5%	72.5%	80.5%	72.5%
Daylight, Warm White ...	75.4%	80.4%	75.5%	71%	79.5%	71%
Peach	73%	80%	73%	71.5%	80%	71.5%
Nat. Daylight, Northlight ...	70.6%	77.5%	74.5%	67.5%	78%	70%

ATLAS "double-life" fluorescent tubes

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326

Complete RECTIFIER SUBSTATION EQUIPMENTS

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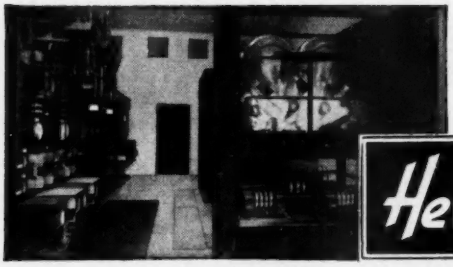

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A substation on the Midland Region System, British Railways, showing in the foreground, H.V. switchgear and, in the background, Hewittic rectifier and high speed D.C. switchgear.

An industrial substation, comprising 1,800 amp. Hewittic Rectifier with associated switchgear.

On right, a 14-panel flat back D.C. switchboard, one of many supplied to the London Transport Executive for feeding trolley-buses at 600 volts.

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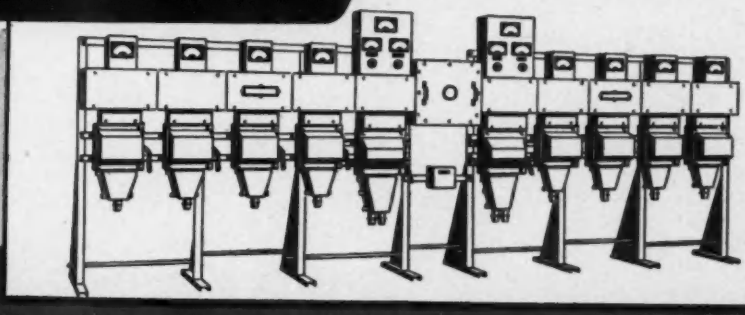

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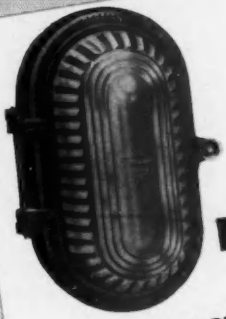

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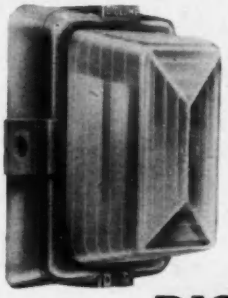

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